Nokia Customer Care
RH-30/RH-31 Series Cellular Phones

Troubleshooting Instructions

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RF Troubleshooting

Introduction to RF troubleshooting

Measurements should be done using Spectrum analyzer with high-frequency high-impedance passive probe (LO-/reference frequencies and RF power levels) and Oscilloscope with a 10:1 probe (DC-voltages and low frequency signals).

The RF-section is build around one RF-ASIC (HELGO N500). For easier troubleshooting, this RF troubleshooting document is divided into sections.

Before changing HELGO, please check the following things: supply voltages are OK and serial communication coming from baseband to HELGO.

Please note that the grounding of the PA module is directly below PA-module so it is difficult to check or change. **Most RF semiconductors are static discharge sensitive!** So ESD protection must be taken care of during repair (ground straps and ESD soldering irons). HELGO and PA are moisture sensitive so parts must be pre-baked prior to soldering.

Apart from key components described in this document here are a lot of discrete components (resistors, inductors and capacitors) which troubleshooting is done by checking if soldering of the component is done properly (for factory repairs checking if it is missing from PWB). Capacitor can be checked for shortening and resistors for value by means of an ohmmeter, but be aware in-circuit measurements should be evaluated carefully.

Please be aware that all measured voltages or RF levels in this document are rough figures. Especially RF levels varies due to different measuring equipment or different grounding of the used probe. When using RF probe usually a good way is to use metallic tweezers to connect probe ground to PWB ground as close to measurement point as possible.

Note! When you are checking RF performance via AMS coupler please remember to ensure that the antenna is properly assembled and the antenna pogo-pins exist and are not jammed. If there is poor contact in antenna, the measurement results via coupler can be incorrect or the call can not be established.

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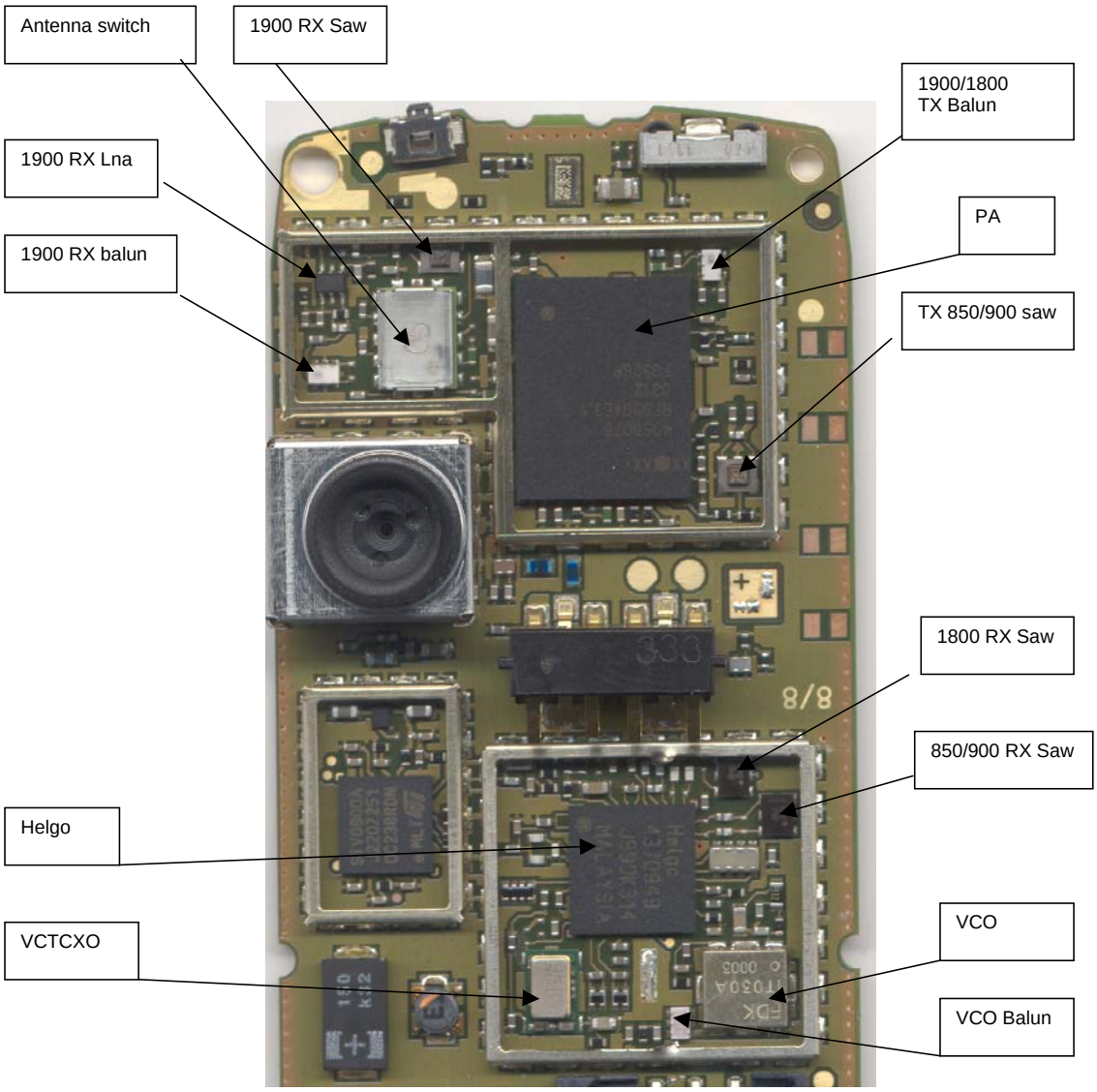
RF key component placement

Figure 1: Component placement 1



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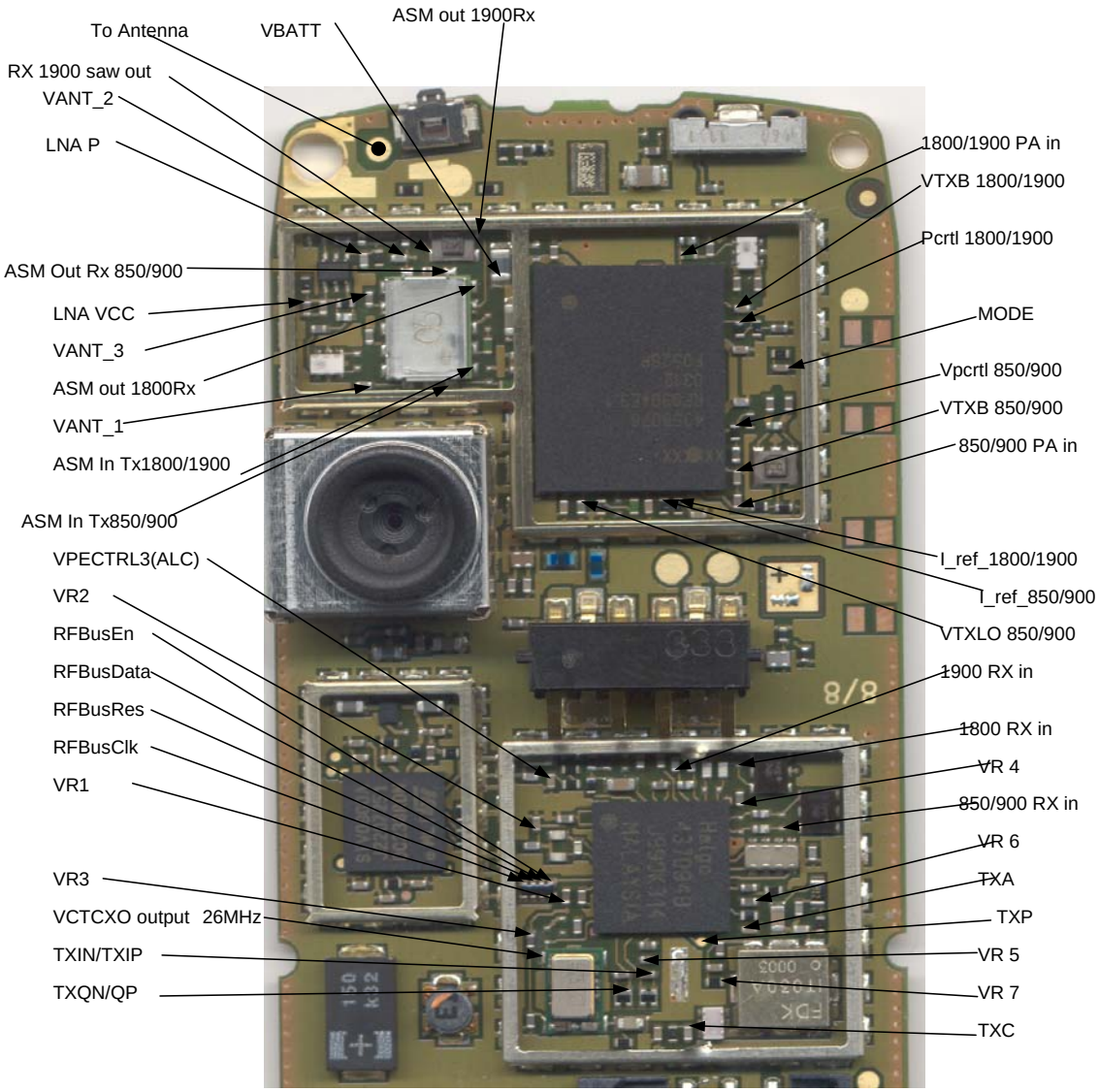
RF measurement points

Figure 2: Component placement 2



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GSM 850, GSM900, GSM1800 & GSM1900 Transmitter

General instructions for Tx troubleshooting

Kindly refer to the Service Software Section, Service Concept dagram (p.40)

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Attention: When repairing or tuning transmitter use external DC supply with at least 3A current capability. Set the DC supply voltage to 3.9V and set the jumper connector on test jig to "bypass" position.

Connect an RF-cable to the module test jig (MJS-38) RF connector and to measurement equipment or at least a 10dB attenuator, otherwise the PA may be damaged. Normally a spectrum analyzer is used as measurement equipment.

Attention: Normally Spectrum analyzer maximum input power is +30dBm. It is recommended to use 10dB attenuator on Spectrum analyzer input to prevent damage.

Set the phone module to test jig and start Phoenix service sofware

Initialize connection to phone. (use FBUS driver when using DAU9S and COMBOX driver when using FPS-8)

Select product from the menu

File -> Choose product -> RH-30/RH-31

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window

- Select band "GSM 850", "GSM900" or "GSM 1800" or "GSM1900" (Default = "GSM900" RH-30, Default= "GSM850" RH-31)
- Set Active unit to "Tx" (Default = "Rx")
- Set Operation mode to "Burst" (Default = "Burst")
- Set Tx data type to "Random" (Default = "All1")
- Set Rx/Tx channel to 190 on GSM 850, 37 on GSM900 band or 700 on GSM1800

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band or 661 on GSM1900 (Defaults)

- Set Tx PA mode to "Free" (Default)
- Set power level to 5 (Default = 19) on GSM 850 and GSM900 or to 0 (Default = 15) on GSM1800 or GSM1900

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Transmitter troubleshooting diagram

Figure 3: Transmitter troubleshooting

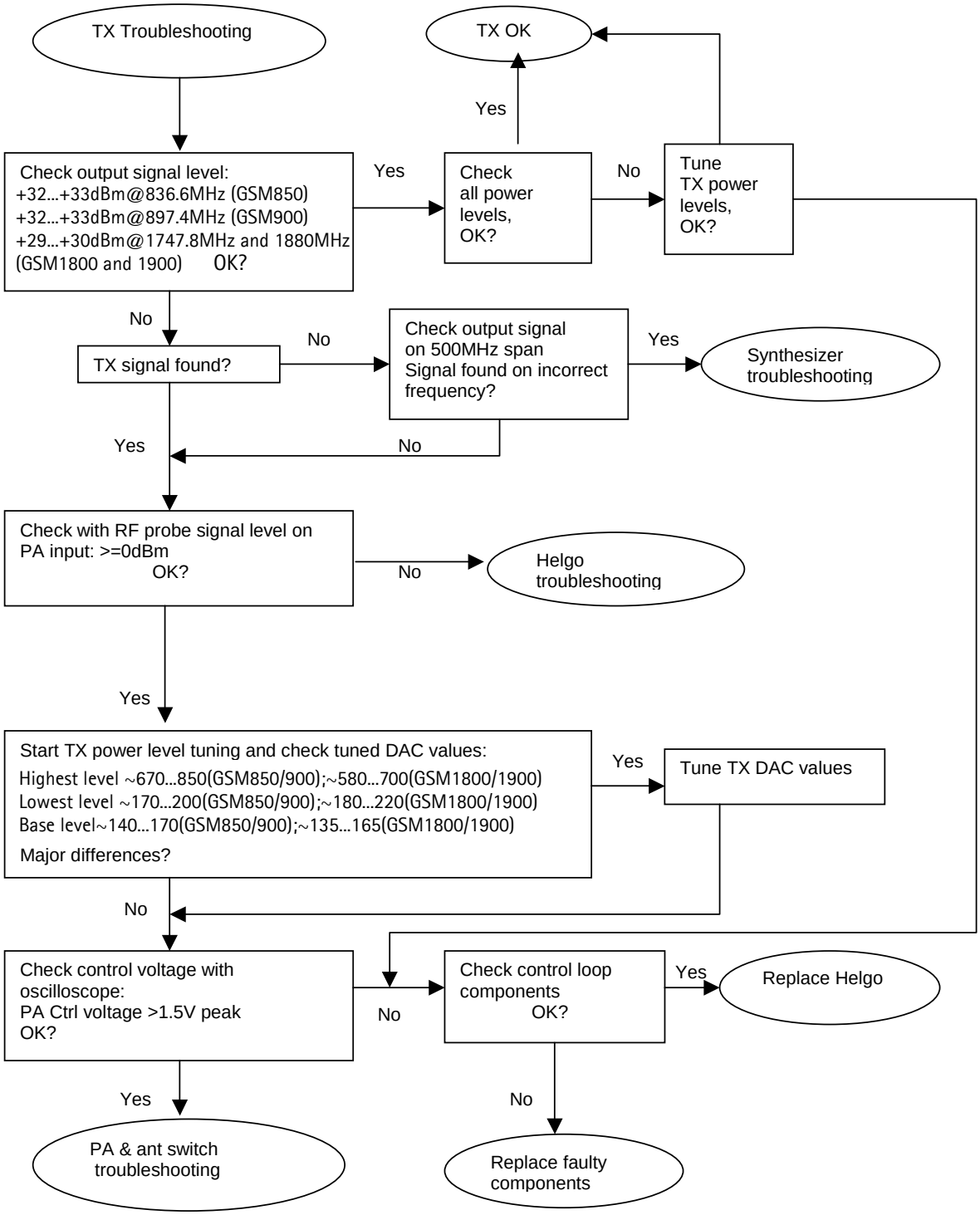

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Figure 4: HELGO IC troubleshooting

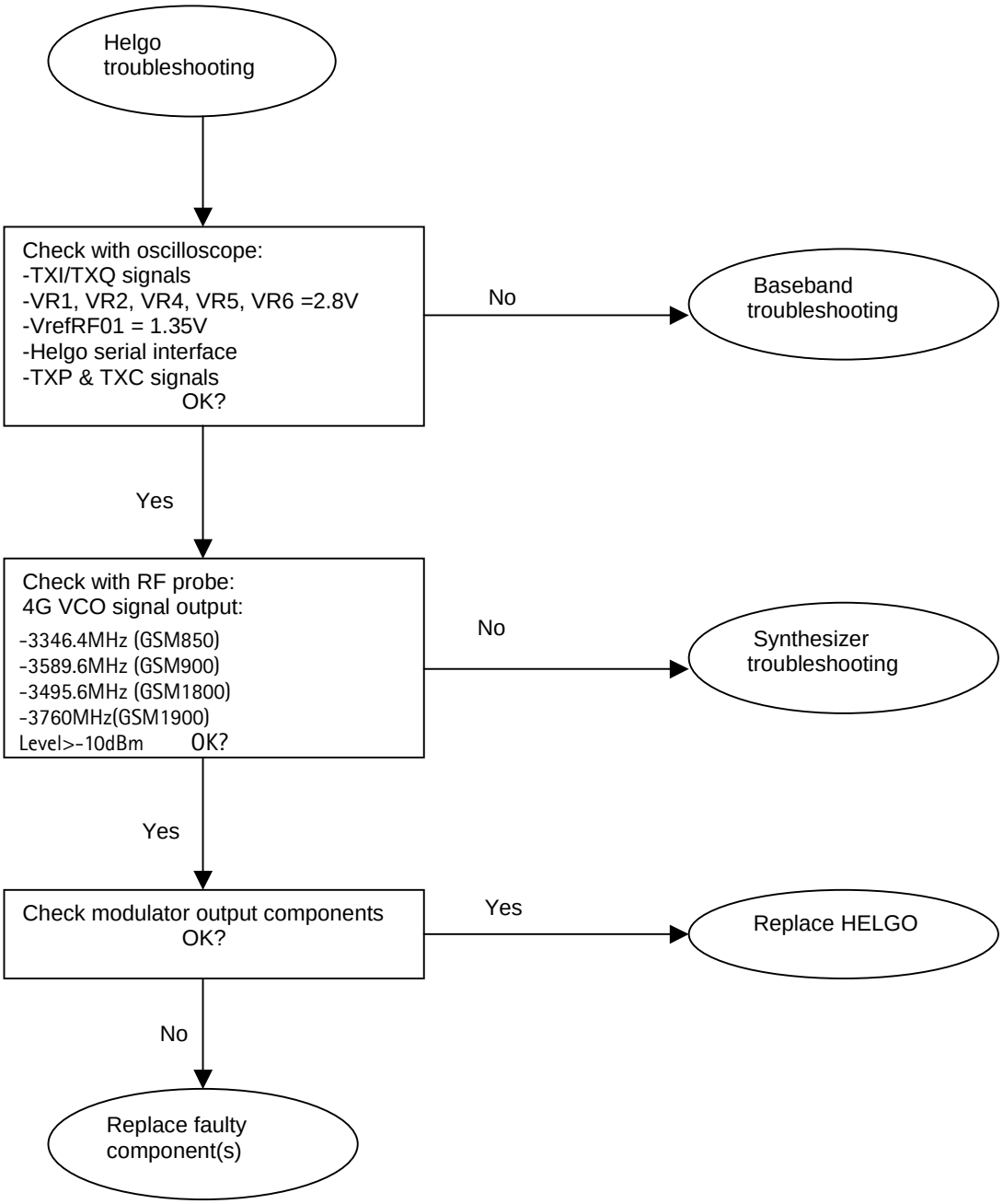

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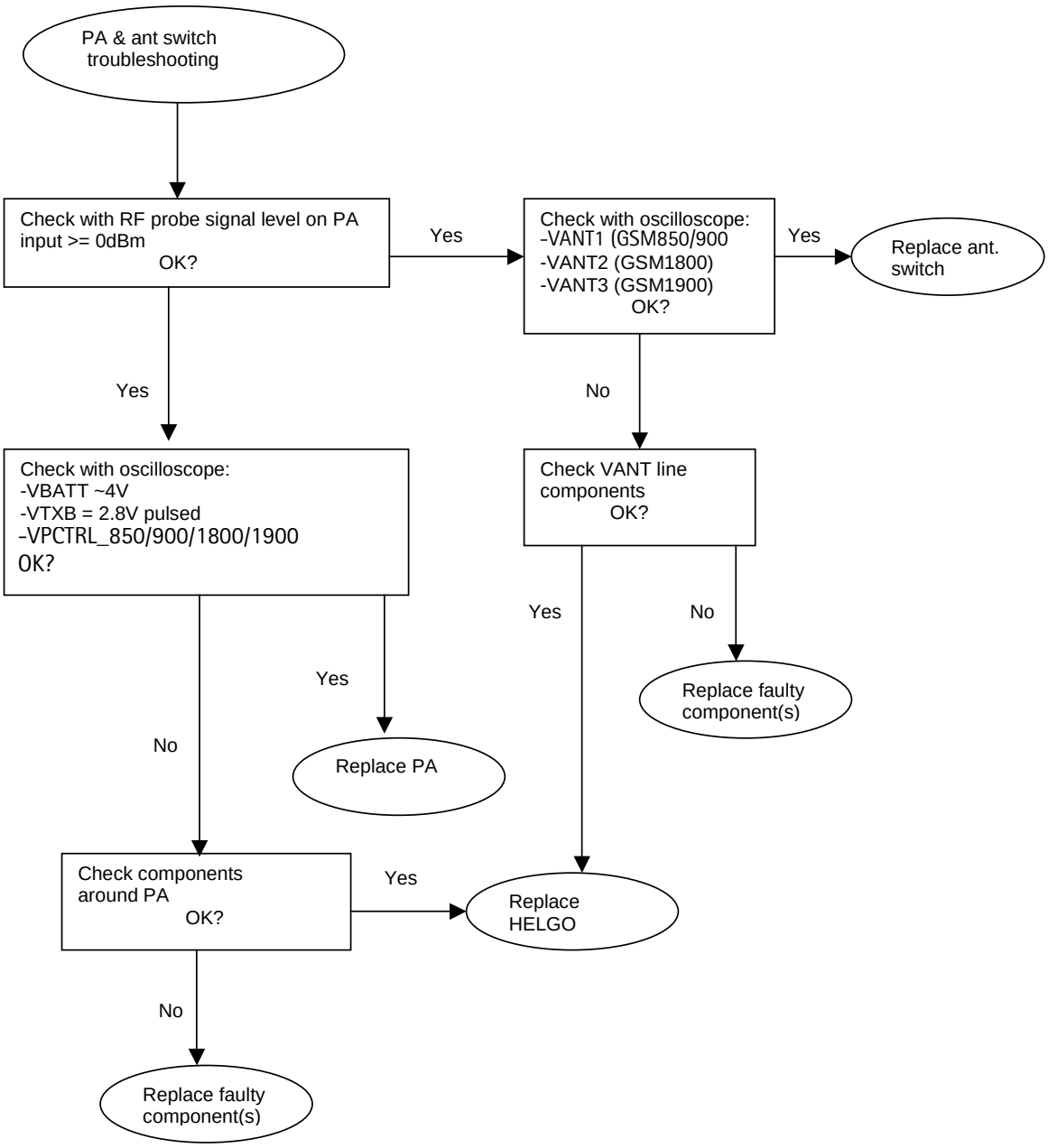
Figure 5: PA and Antenna Switch troubleshooting



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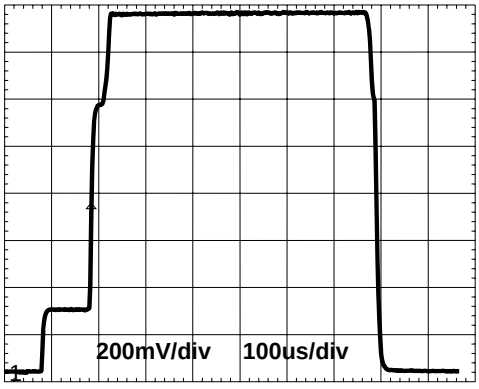
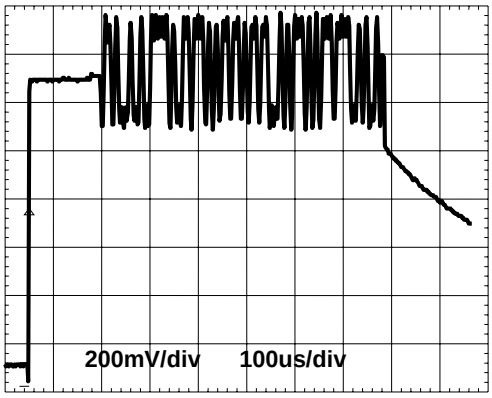
Pictures of transmitter signals



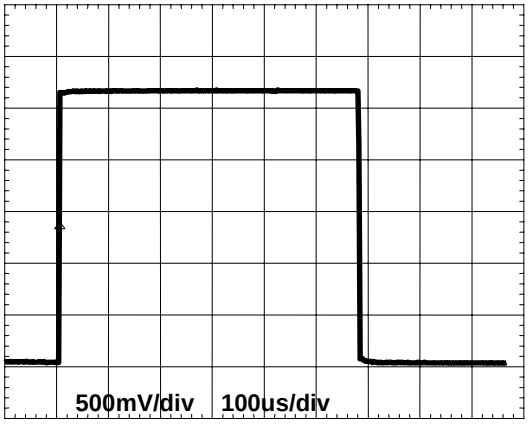
TXI

VPCTRL _850/900 power level high at R703/C703
VPCTRL_1800/1900 power level high at R704/C704_

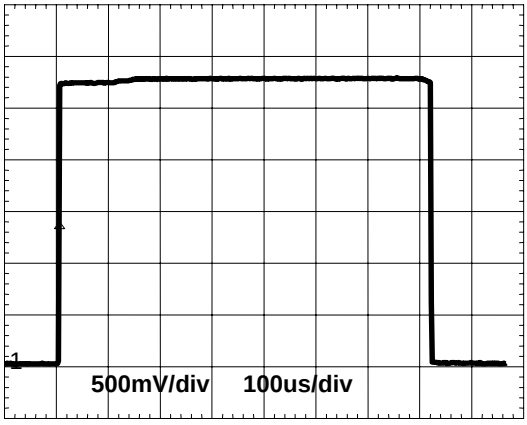


VPCT

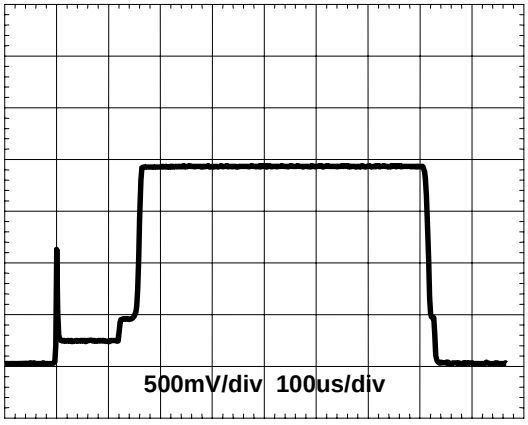
X I/Q at R516/517 power level high Random data



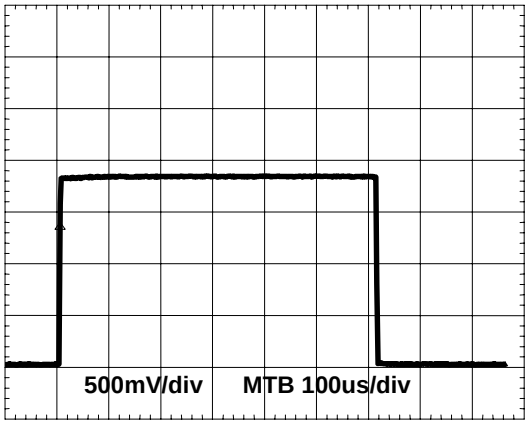
VANT_1 / GSM850/900 TX at C805
VANT_2 / GSM1800 TX at R804
VANT_3 / GSM1900 TX at C806 0V
(no signal/ Flatline on Oscilloscope screen)



VANT_1,VANT_2,VANT_3



VTXB_900 at C713, VTXB_850 at C 713
VTXB_1800_1900 at C714



TXP at J504

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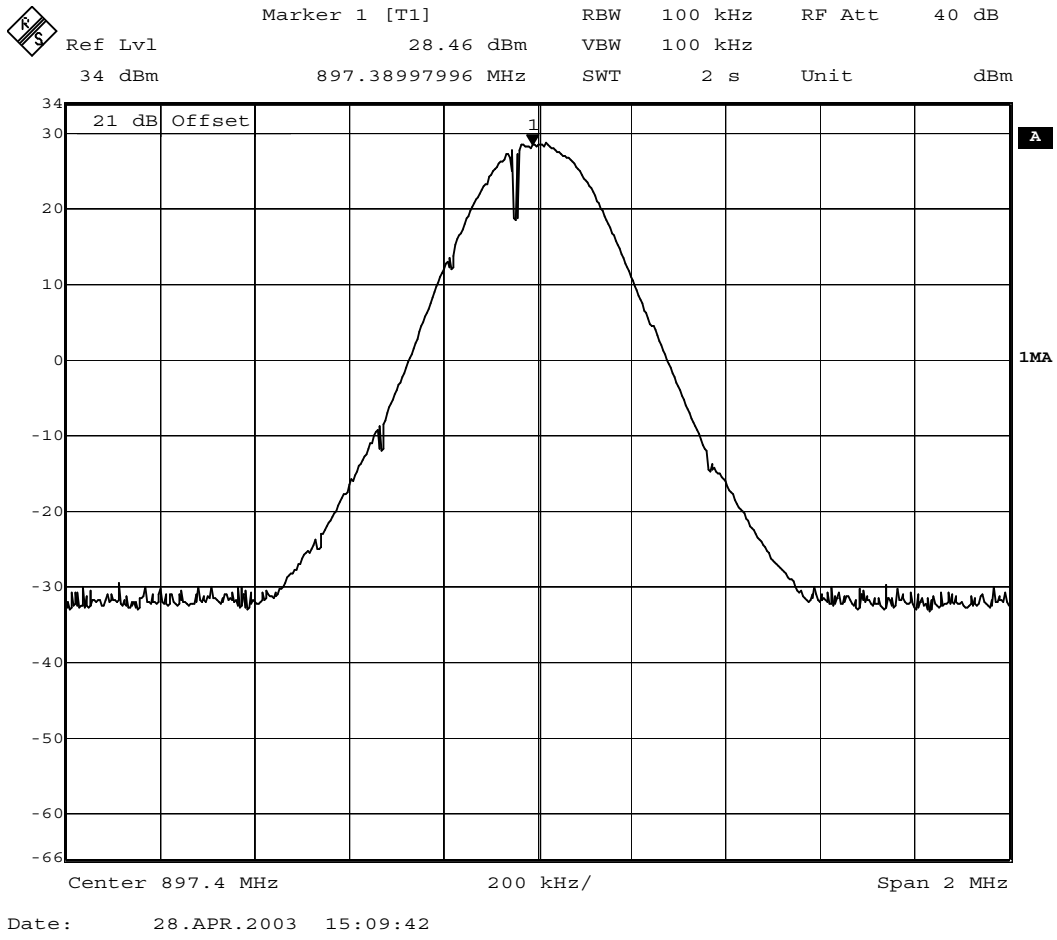
Figure 6: Tx out signal, 900 band, burst mode, channel 37



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Additional Information for EDGE Troubleshooting

EDGE mode troubleshooting differs slightly from basic GSM troubleshooting.

Establish connection to the phone normally (see GSM850/900/1800/1900 troubleshooting instructions).

Select product from the menu:

File -> Choose Product -> RH-30/RH-31

From toolbar set operating mode to “Local”

Activate RF controls window from the menu:

Testing -> RF Controls

From the RF controls window:

- Select Band “GSM850” , “GSM900” or “GSM1800” or “GSM1900” (Default = "GSM900" RH-30, Default= “GSM850” RH-31)
- Set Active unit to “Tx” (Default=”Rx”)
- Set Edge “On” (Default=”Off”)
- Set Operation mode to “Burst” (Default=”Burst”)
- Set Tx data type to “Alternate PN9” (Default=”All1”)
- Set Rx/Tx channel to 190 on GSM850, 37 on GSM900 or 700 on GSM1800 or 661 on GSM1900 (Defaults)
- Set power level to 8 (Default = 19) on GSM850 and GSM900 or to 2 (Default = 0) on GSM1800 or GSM1900

NOTE! For GSM850/900 Edge power levels 5, 6 and 7 are not in use and for GSM1800&1900 Edge power levels 0 and 1 are not in use.

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Figure 7: Transmitter EDGE troubleshooting

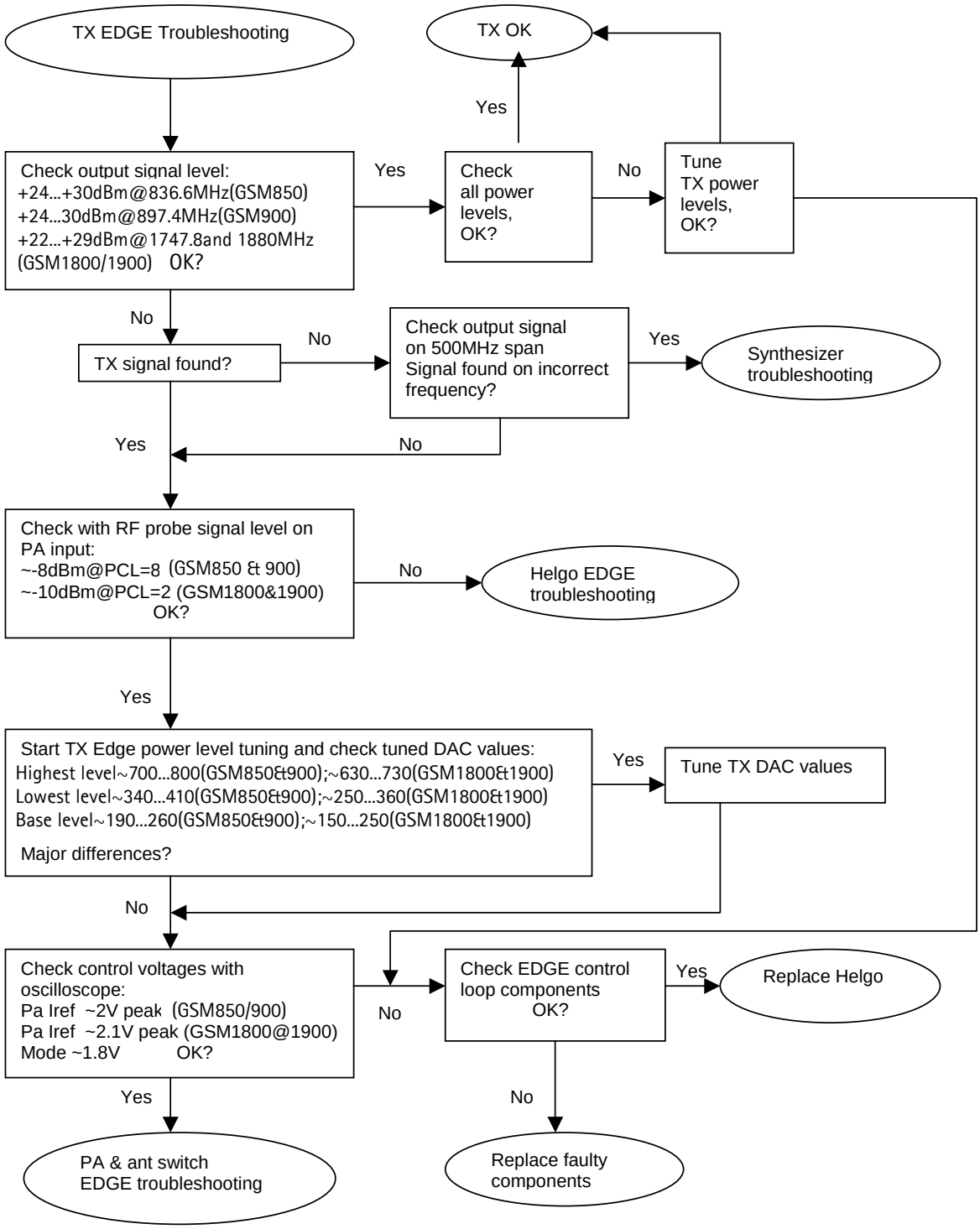

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Figure 8: Helgo EDGE troubleshooting

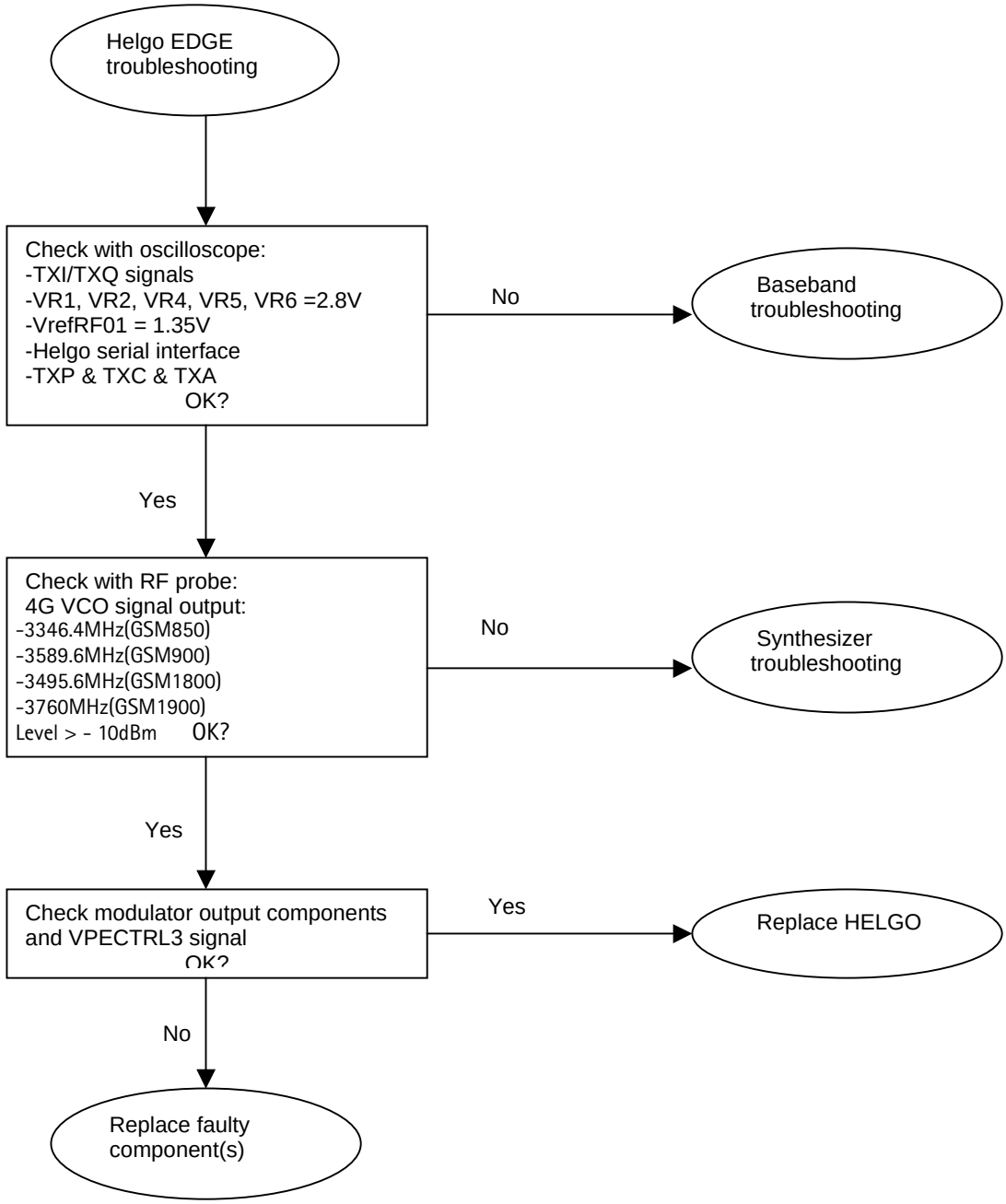

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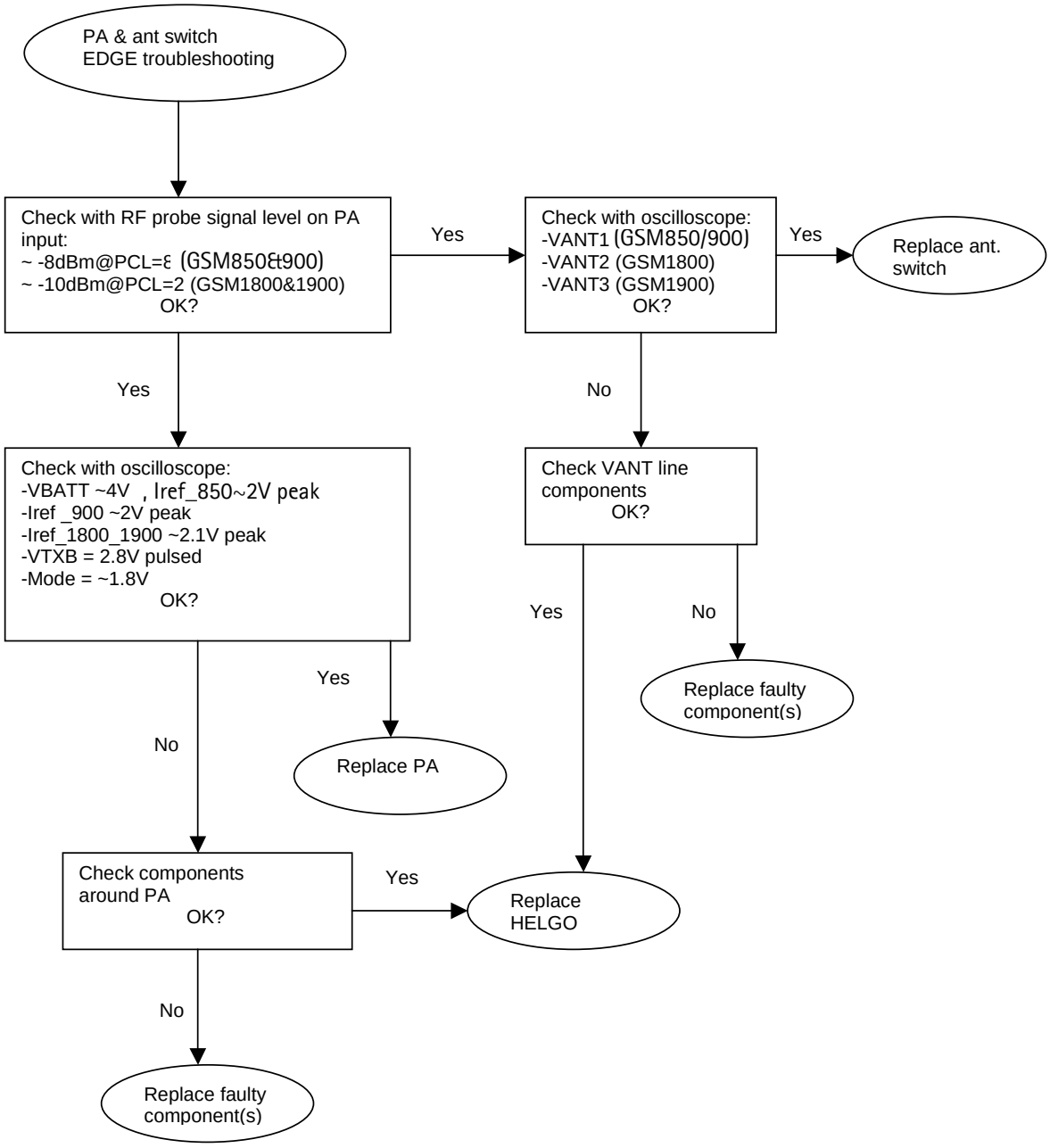
Figure 9: Pa & ant switch EDGE troubleshooting



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Pictures of EDGE transmitter signals

Figure 10: I_ref_850/900 power level 8 at R701/C701

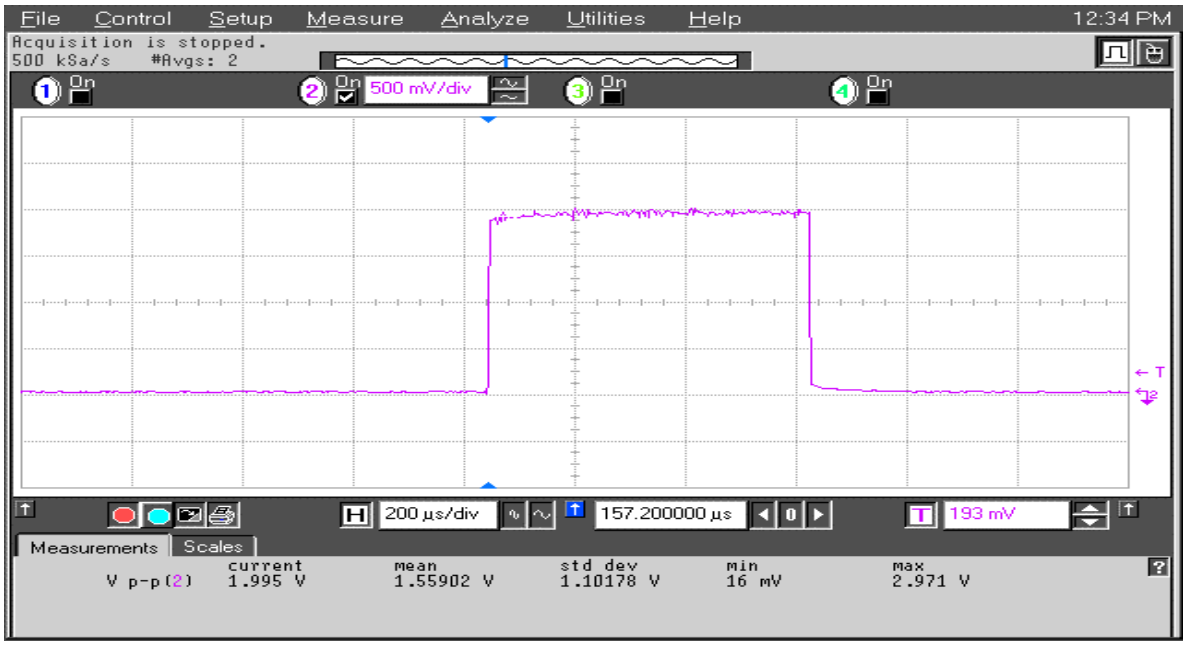

Figure 11: VTXB 850/900 power level 8 at C713

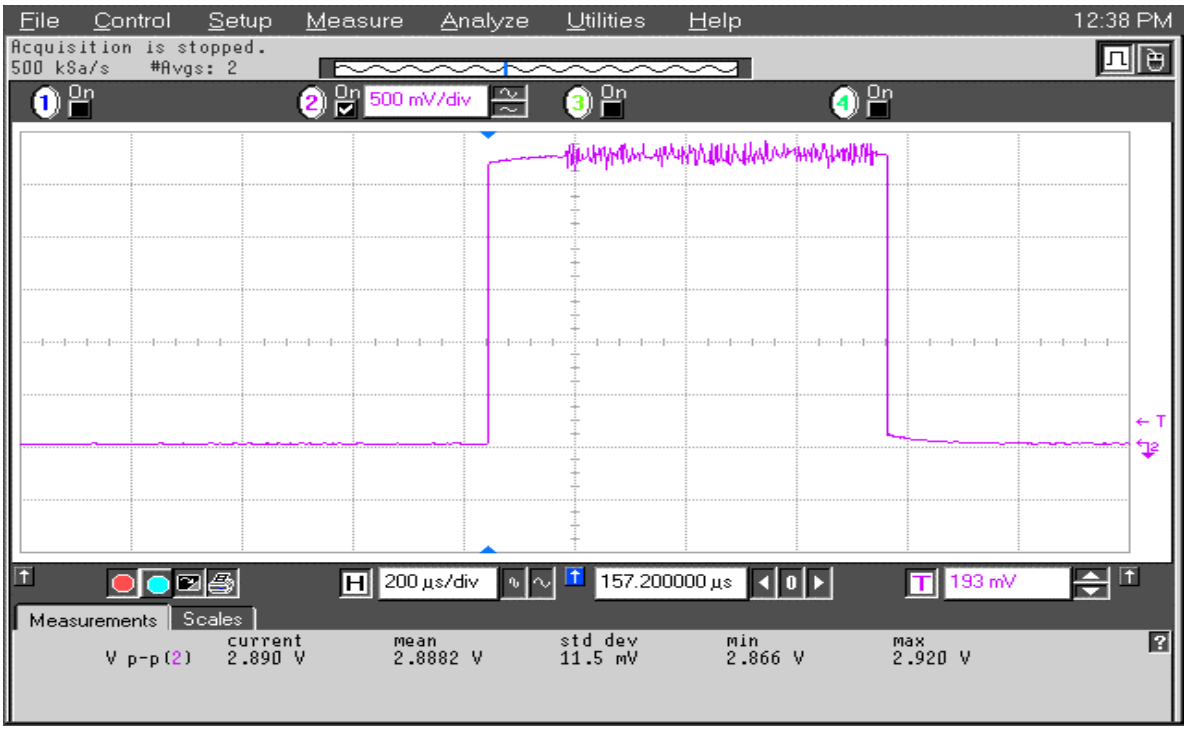

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Figure 12: I_ref_1800/1900 power level 2 at R700/C700

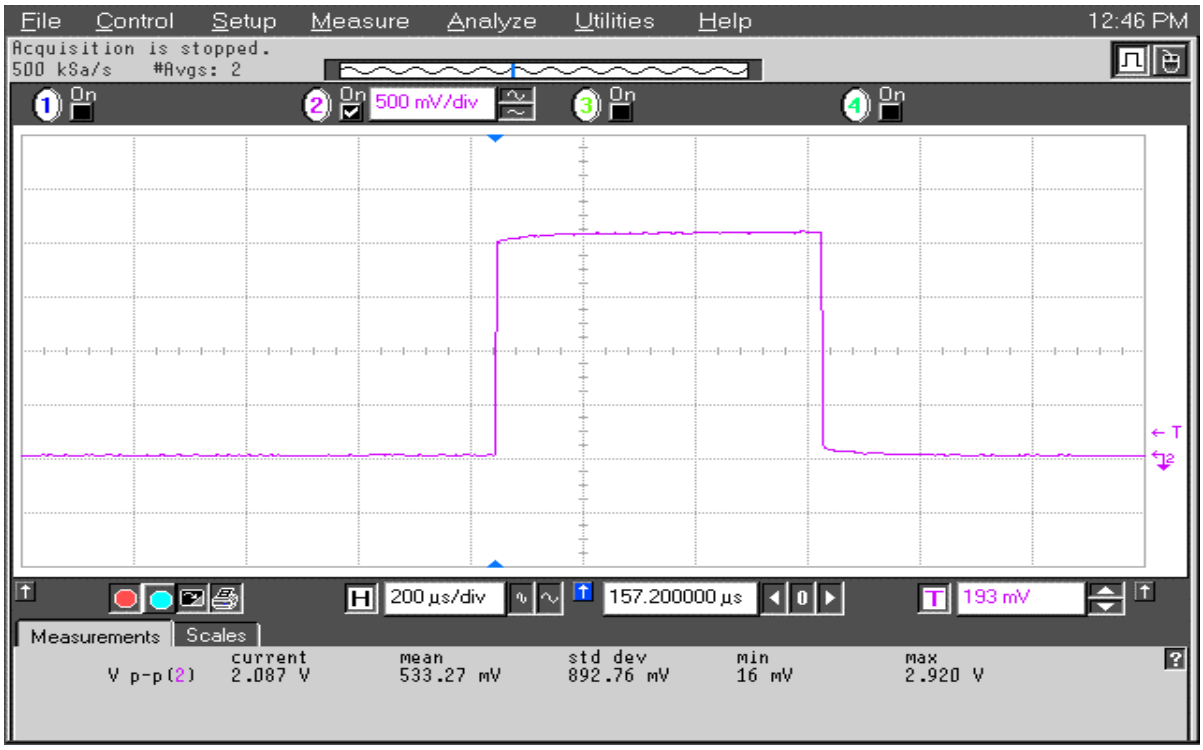
File Control Setup Measure Analyze Utilities Help 12:46 PM
Acquisition is stopped.
500 kSa/s #Avgs: 2
On On 500 mV/div On On
200 µs/div 157.200000 µs 193 mV
Measurements Scales
current mean std dev min max
V p-p(2) 2.087 V 533.27 mV 892.76 mV 16 mV 2.920 V

Figure 13: VTXB 1800/1900 power level 2 at C714

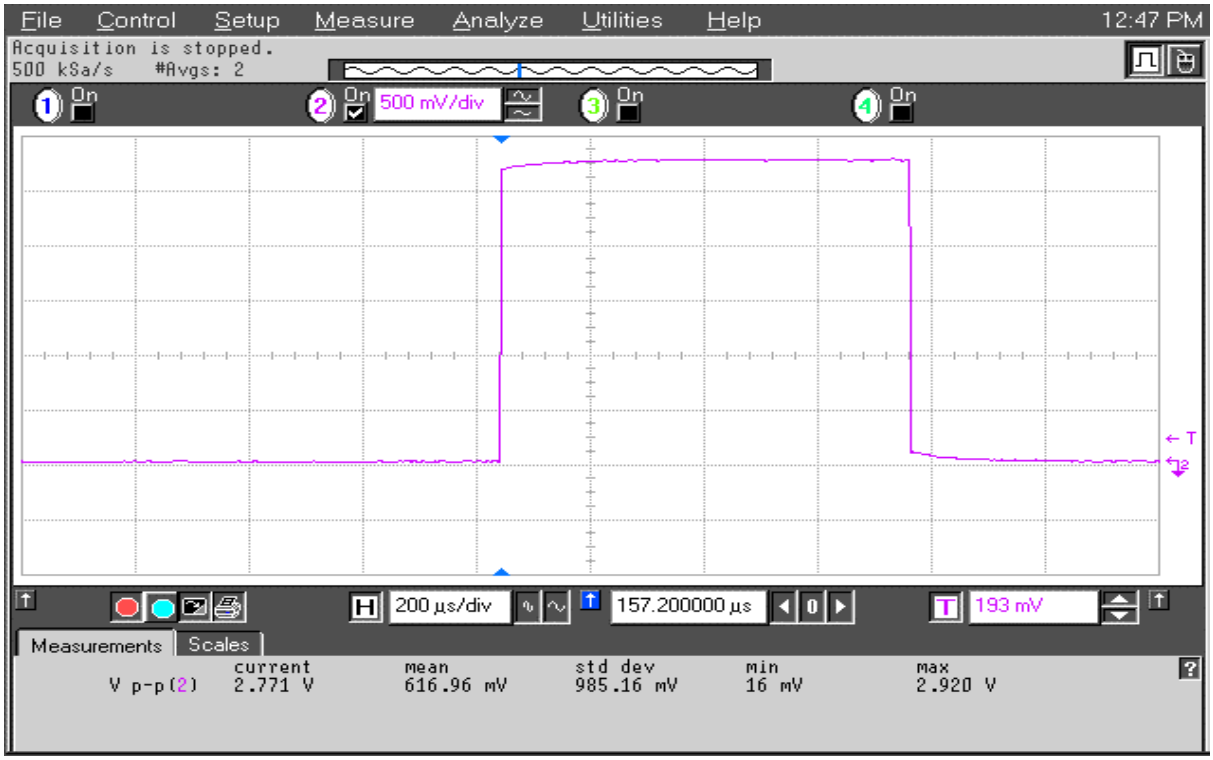
File Control Setup Measure Analyze Utilities Help 12:47 PM
Acquisition is stopped.
500 kSa/s #Avgs: 2
On On 500 mV/div On On
200 µs/div 157.200000 µs 193 mV
Measurements Scales
current mean std dev min max
V p-p(2) 2.771 V 616.96 mV 985.16 mV 16 mV 2.920 V

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Figure 14: TXA 850/900/1800/1900 at C538

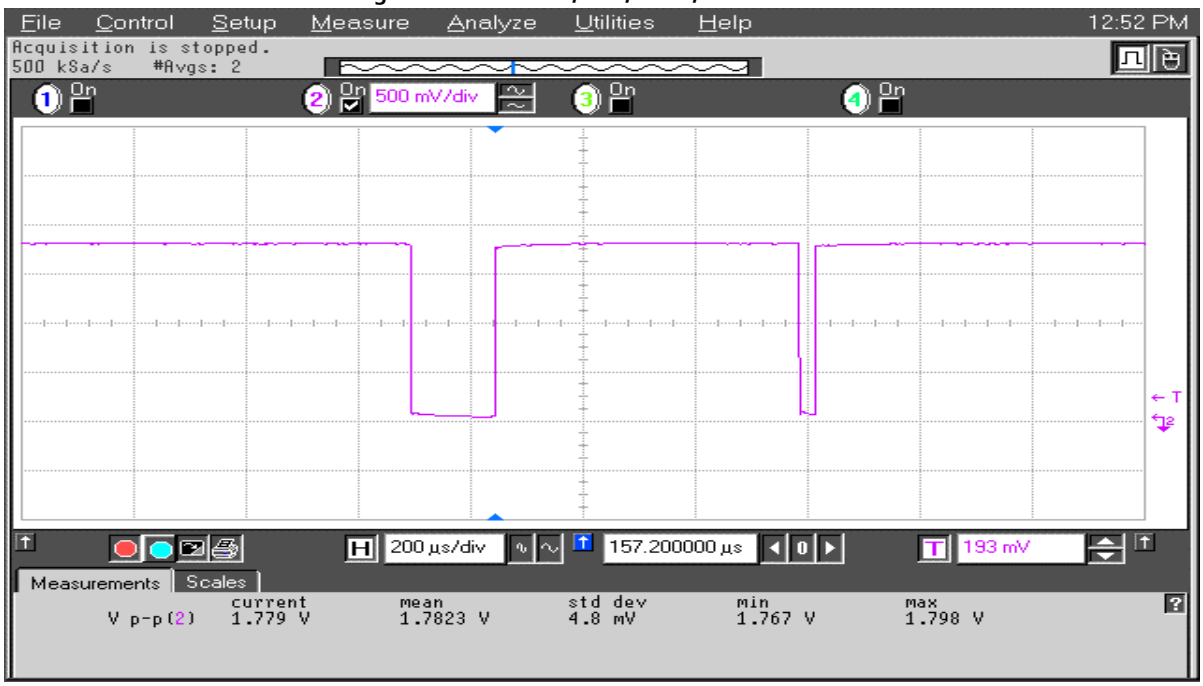

Figure 15: TXI/TXQ signal at C535/C536/R516/R517

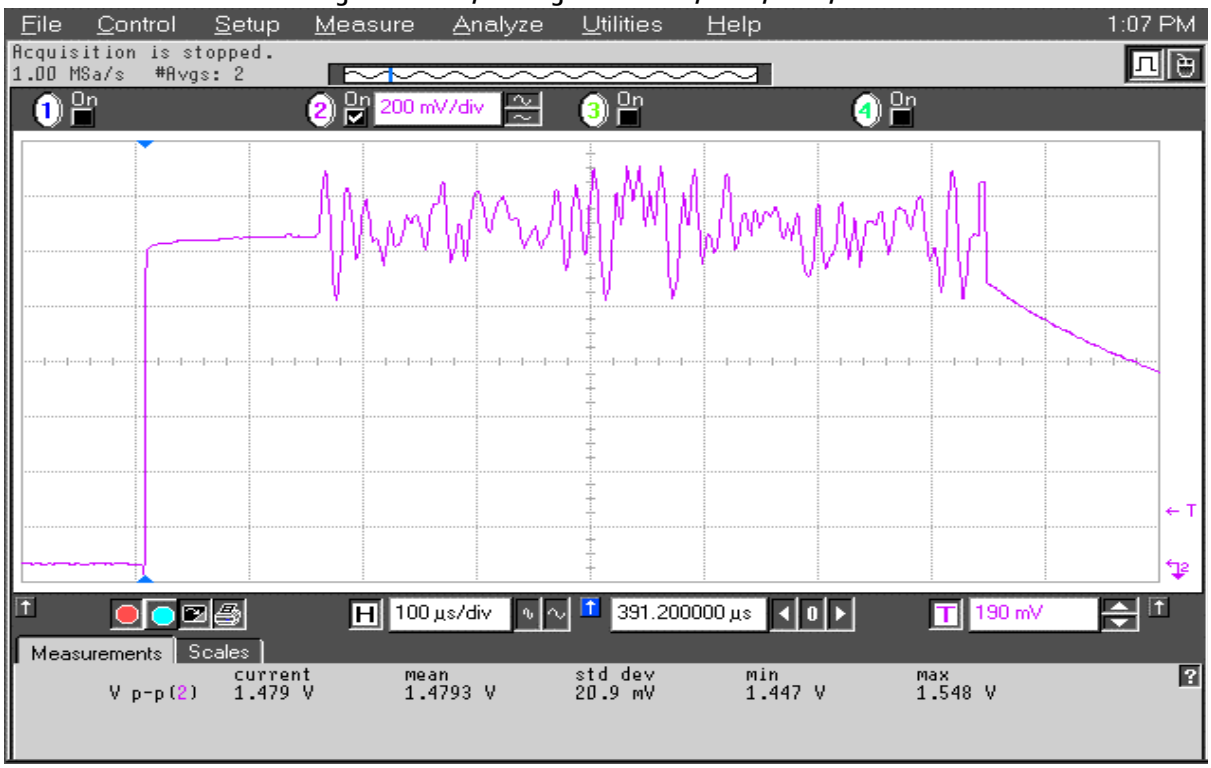

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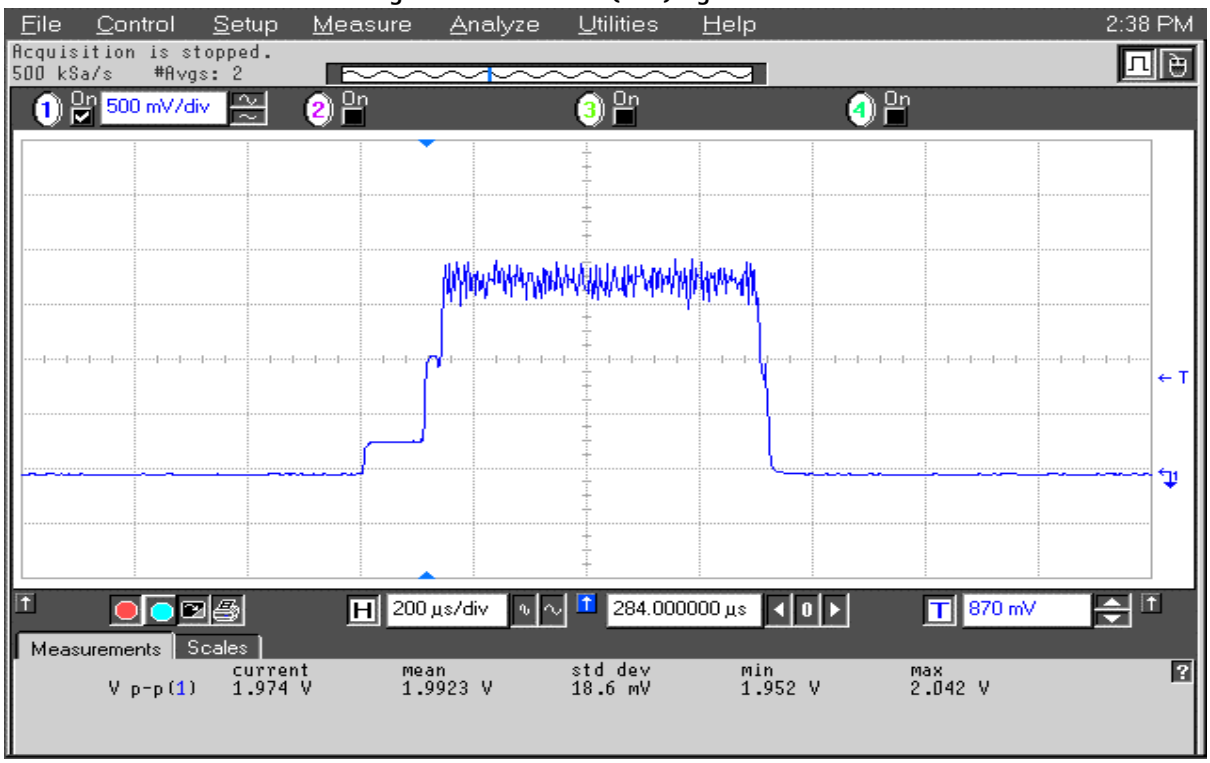
Figure 16: VPECTRL3 (ALC) signal at C512



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GSM 850, GSM900, GSM1800 and GSM1900 Receiver

General instructions for Rx troubleshooting

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply to module test jig with FLC-2 cable.

Set the DC supply voltage to 4,2 V .

Connect an RF-cable to the module test jig (MJS-38) RF connector and to RF signal generator.

Set the phone module to test jig and start Phoenix service sofware.

Initialize connection to phone. (use FBUS driver when using DAU-9S and COMBOX driver when using FPS-8)

Choose product from the menu

File -> Choose product -> RH-30/RH-31

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window:

- Select band “GSM850", GSM 900", "GSM 1800" or “GSM1900” (Default = "GSM900" RH-30, Default= “GSM850” RH-31)
- Set Active unit to "Rx" (Default = "Rx")
- Set Operation mode to "Burst" (Default = "Burst")

For continuous mode:

- Set Operation mode to "Continuous"
- Set AGC to "12: FEG_ON + DTOS_ON + BB_30=Vgain60" (maximum gain setting used in normal mode)
  (Default = "14: FEG_ON + DTOS_ON + BB_42=Vgain72")
- Set Rx/Tx channel to 190 on GSM 850, 37 on GSM900 band, 700 on GSM1800 band or 661 on GSM1900 (Defaults)

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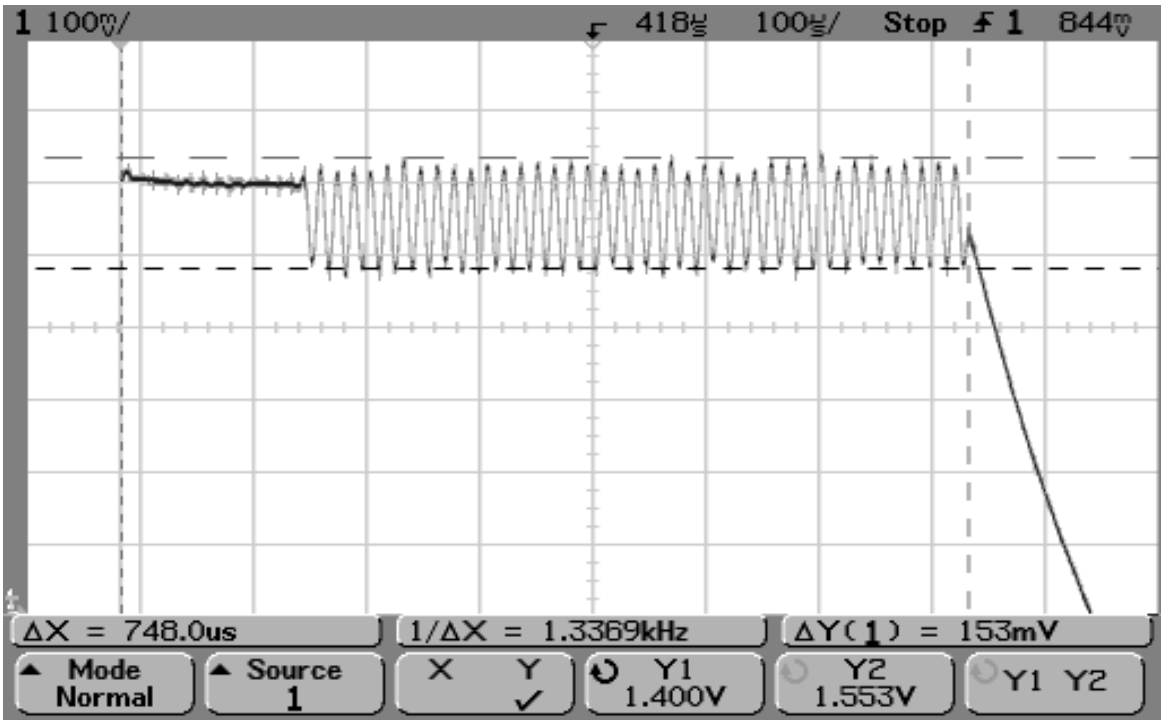
Apply 881,6671 MHz (channel 190 + 67,710 KHz offset), 942.46771 MHz (channel 37 + 67.710 kHz offset), 1842.86771 MHz (channel 700 + 67.710 kHz offset) or 1960.06771 MHz (channel 661 + 67.71 kHz) –90 dBm signal to the RF-connector (remember to compensate for cable attenuation).

Measuring with an oscilloscope on "RXI" or "RXQ" following screens should be seen on a working GSM900 , GSM1800 or GSM1900 receiver:

Figure 17: RX I/Q signal ,burst mode, input level –90dBm.



Receiver I or Q burst mode signal (channel 37) measured from testpoint RXI or RXQ with 942.46771 MHz signal, input level –90dBm at RF-connector.

Correct signal amplitudes approximately:

- GSM850 ~170mVpp
- GSM900 ~170mVpp
- GSM1800 ~140mVpp
- GSM1900 ~160mVpp

Signal part frequency 67.7kHz sine.

DC level of signal part is 1.35V. DC level can variate about +/-100mV between I and Q signals and between different bands as well.

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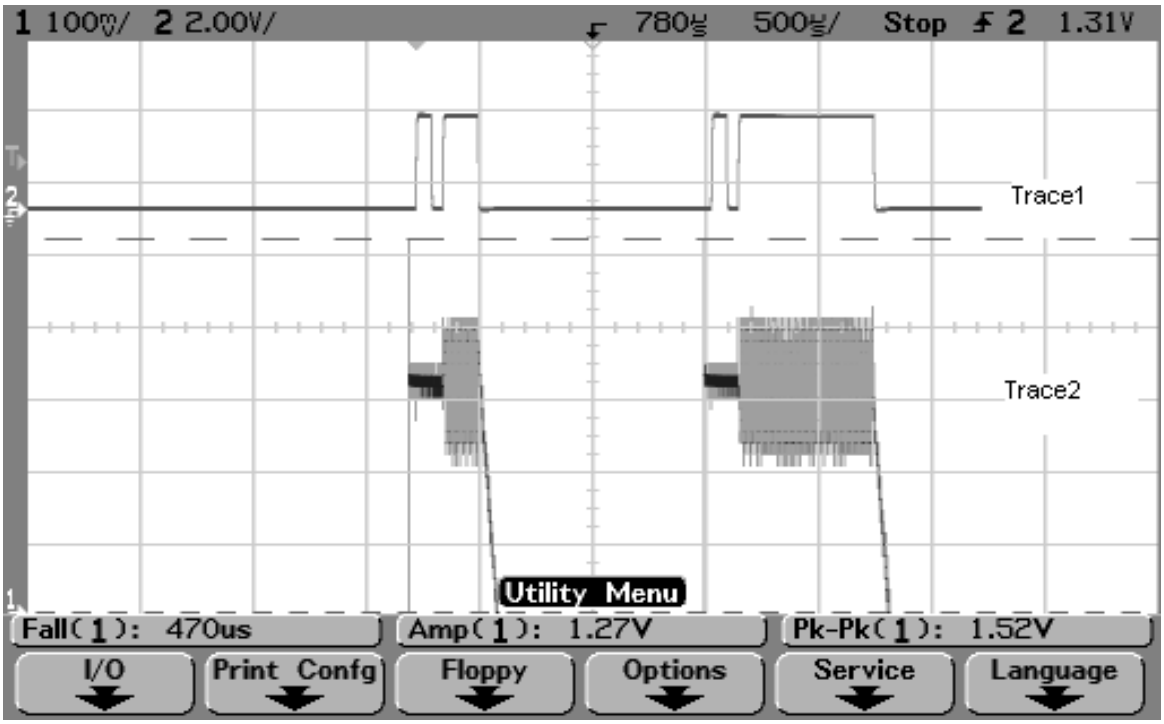
Figure 18: GSM1900 RX I or Q signal (trace2), burst mode.



GSM1900 receiver burst mode I or Q signal at ch 661 with input signal 1960.067MHz, level –90 dBm at RF-connector.

Trace2: With wider time scaling both monitoring and own RX bursts are seen, 1st burst (shorter) is monitoring and 2nd burst (longer) is own RX burst.

Trace1: External LNA VCC supply voltage at burst mode, input level –90 dBm. Measured from testpoint LNA_VCC.

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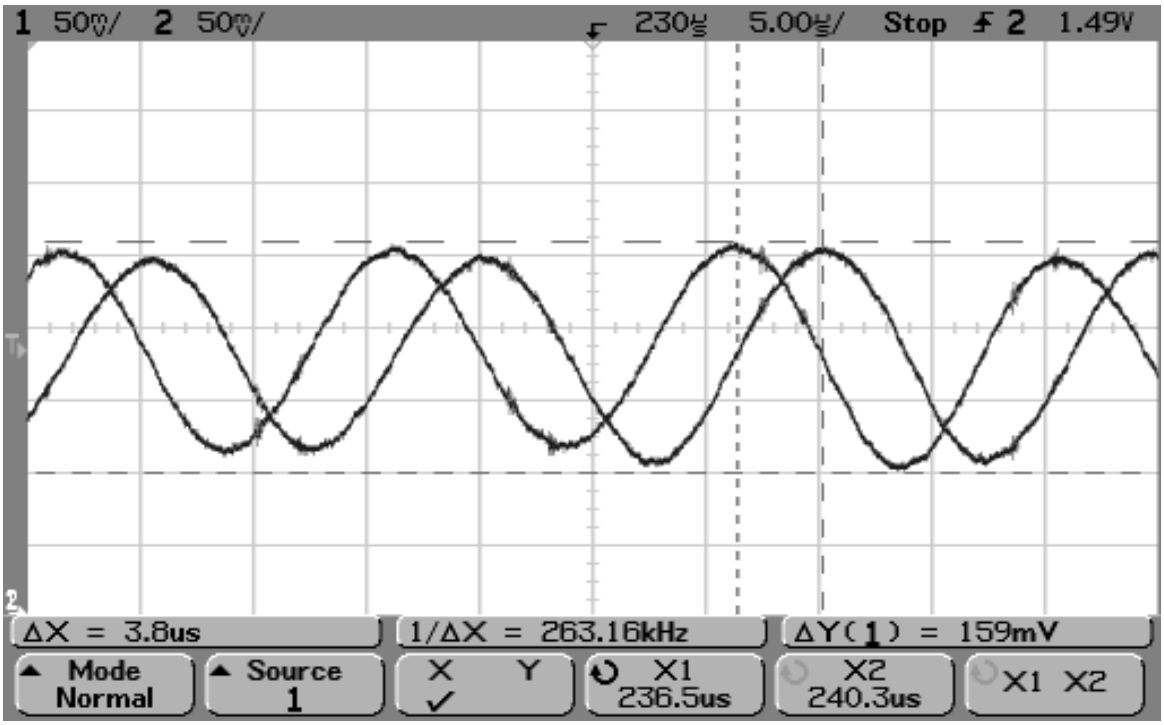
Figure 19: RX I&Q, phase difference 90 deg between signals.



Detailed view of GSM900 continuous mode RX I and Q signals measured from testpoints RXI and RXQ simultaneously.

Used channel 37, input signal 942.46771 MHz, level –90 dBm at antenna port, AGC setting 12.

Phase difference should be 90 degrees between RX I and Q signals at all bands.

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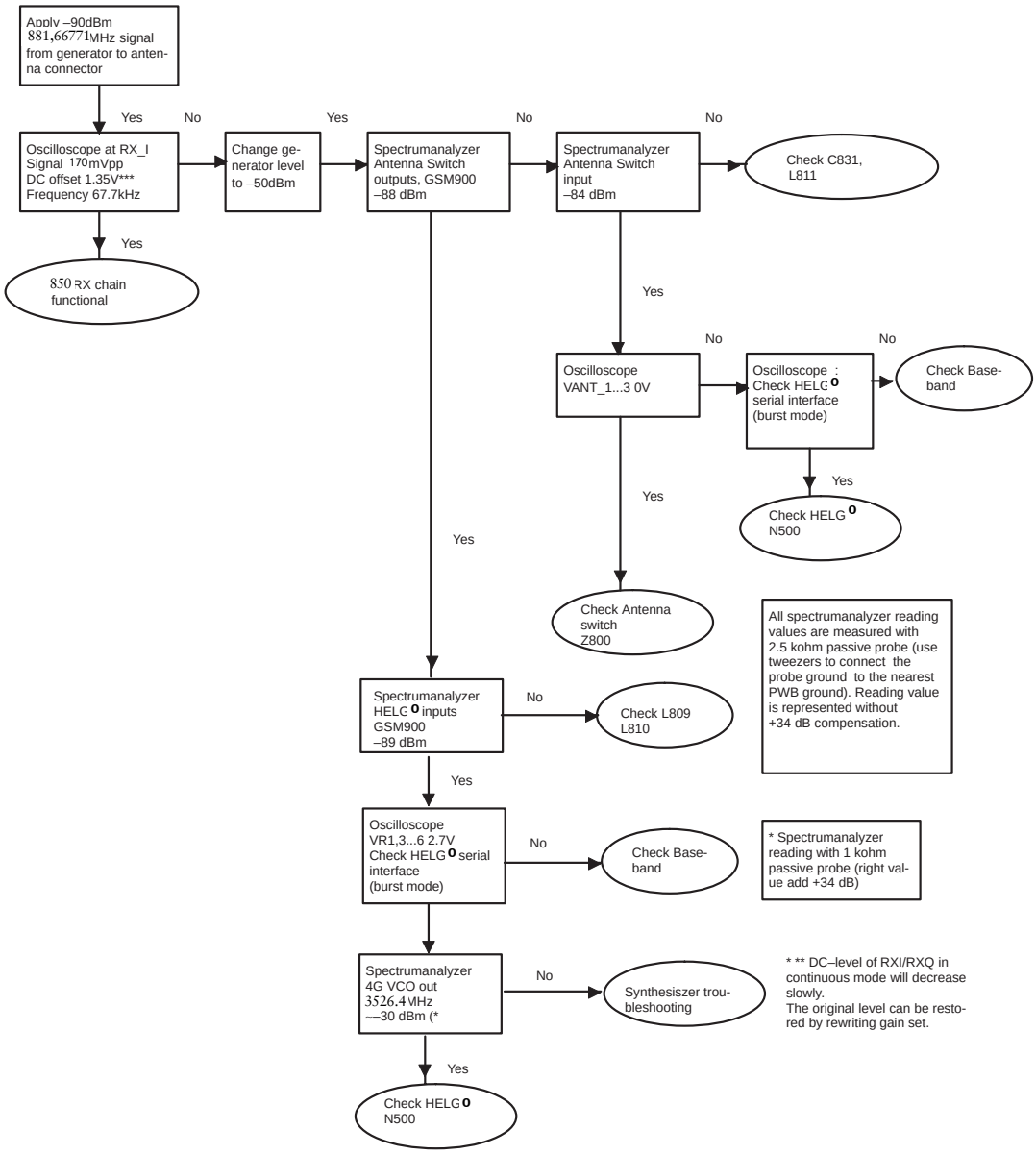
Troubleshooting diagram for GSM850 receiver

Phone in "Continuous" mode, AGC setting "12"

Figure 20: GSM850 receiver troubleshooting


Apply –90dBm 881,66771MHz signal from generator to antenna connector
Yes
No
Oscilloscope at RX_I Signal 170mVpp DC offset 1.35V*** Frequency 67.7kHz
Change generator level to –50dBm
Yes
Spectrumanalyzer Antenna Switch outputs, GSM900 –88 dBm
No
Spectrumanalyzer Antenna Switch input –84 dBm
No
Check C831, L811
Yes
850 RX chain functional
Yes
Oscilloscope VANT_1...3 0V
No
Oscilloscope : Check HELG O serial interface (burst mode)
No
Check Base-band
Yes
Check HELG O N500
Yes
Check Antenna switch Z800
Yes
Spectrumanalyzer HELG O inputs GSM900 –89 dBm
No
Check L809 L810
Yes
Oscilloscope VR1,3...6 2.7V Check HELG O serial interface (burst mode)
No
Check Base-band
Spectrumanalyzer 4G VCO out 3526.4 MHz —30 dBm (*
No
Synthesiszer trou-bleshooting
Yes
Check HELG O N500
All spectrumanalyzer reading values are measured with 2.5 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +34 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +34 dB)
* ** DC–level of RXI/RXQ in continuous mode will decrease slowly.
The original level can be restored by rewriting gain set.

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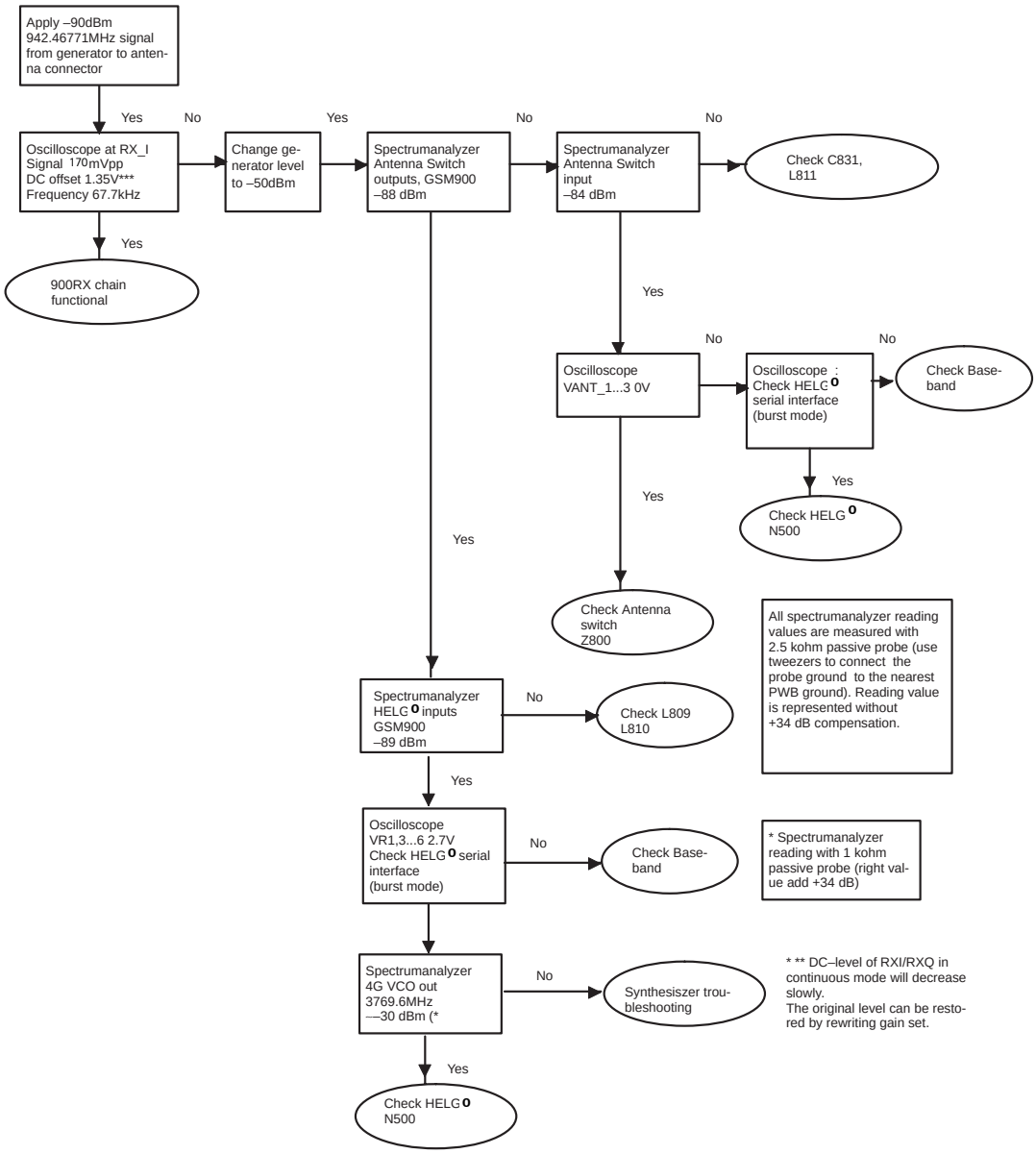
Troubleshooting diagram for GSM900 receiver

Phone in "Continuous" mode, AGC setting "12"

Figure 21: GSM900 receiver troubleshooting


Apply –90dBm 942.46771MHz signal from generator to antenna connector
Yes
No
Oscilloscope at RX_I Signal 170mVpp DC offset 1.35V*** Frequency 67.7kHz
Change generator level to –50dBm
Yes
Spectrumanalyzer Antenna Switch outputs, GSM900 –88 dBm
No
Spectrumanalyzer Antenna Switch input –84 dBm
No
Check C831, L811
Yes
900RX chain functional
Yes
Oscilloscope VANT_1...3 0V
No
Oscilloscope : Check HELG O serial interface (burst mode)
No
Check Base-band
Yes
Check HELG O N500
Yes
Yes
Check Antenna switch Z800
Spectrumanalyzer HELG O inputs GSM900 –89 dBm
No
Check L809 L810
Yes
Oscilloscope VR1,3...6 2.7V Check HELG O serial interface (burst mode)
No
Check Base-band
Spectrumanalyzer 4G VCO out 3769.6MHz —30 dBm (*
No
Synthesiszer trou-bleshooting
Yes
Check HELG O N500
All spectrumanalyzer reading values are measured with 2.5 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +34 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +34 dB)
* ** DC–level of RXI/RXQ in continuous mode will decrease slowly.
The original level can be restored by rewriting gain set.

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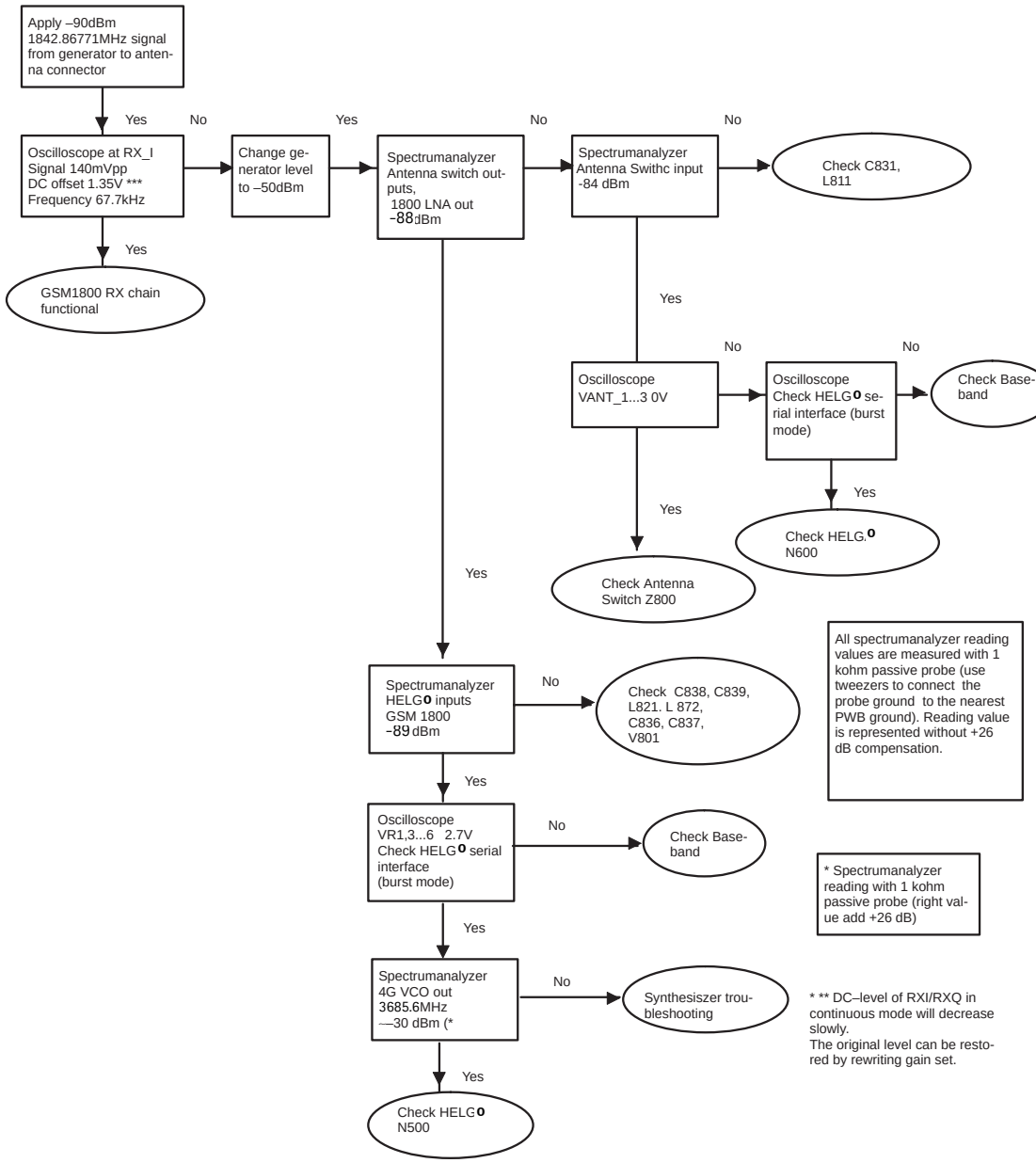
Troubleshooting diagram for GSM1800 receiver

Phone in "Continuous" mode, AGC setting "12

Figure 22: GSM1800 receiver troubleshooting


Apply –90dBm 1842.86771MHz signal from generator to antenna connector
Yes
No
Oscilloscope at RX_I Signal 140mVpp DC offset 1.35V *** Frequency 67.7kHz
Change generator level to –50dBm
Yes
Spectrumanalyzer Antenna switch outputs, 1800 LNA out -88dBm
No
Spectrumanalyzer Antenna Swithc input -84 dBm
No
Check C831, L811
Yes
GSM1800 RX chain functional
Yes
Oscilloscope VANT_1...3 0V
No
Oscilloscope Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Check HELGO N600
Yes
Check Antenna Switch Z800
Yes
Spectrumanalyzer HELGO inputs GSM 1800 -89 dBm
No
Check C838, C839, L821. L 872, C836, C837, V801
Yes
Oscilloscope VR1,3...6 2.7V Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Spectrumanalyzer 4G VCO out 3685.6MHz —30 dBm (*
No
Synthesiszer troubleshooting
Yes
Check HELGO N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26 dB)
* ** DC–level of RXI/RXQ in continuous mode will decrease slowly.
The original level can be restored by rewriting gain set.

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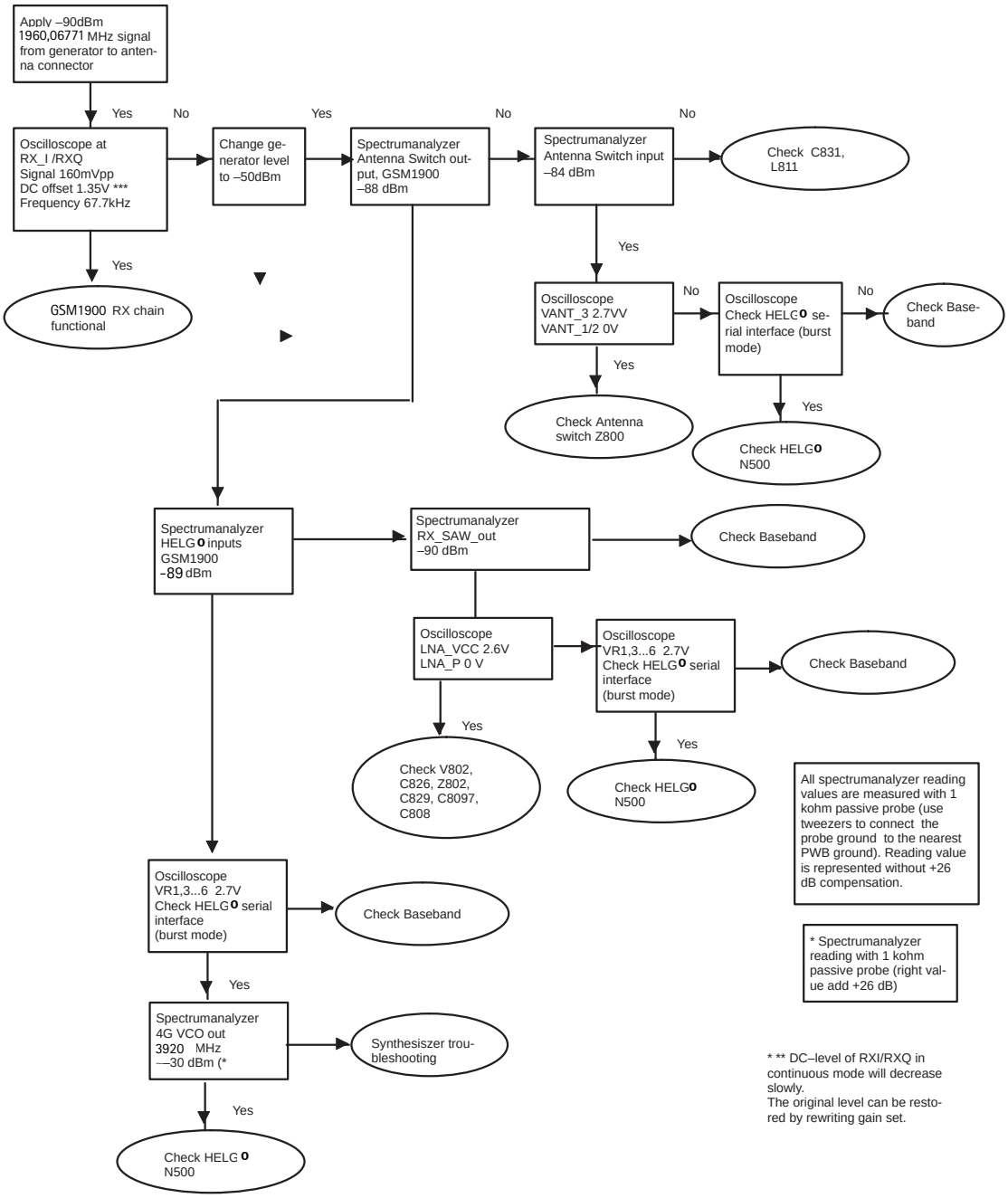
Troubleshooting diagram for GSM1900 receiver

Phone in "Continuous" mode, AGC setting "12

Figure 23: GSM1900 receiver troubleshooting


Apply –90dBm 1960,06771 MHz signal from generator to antenna connector
Yes
No
Oscilloscope at RX_I /RXQ Signal 160mVpp DC offset 1.35V *** Frequency 67.7kHz
Change generator level to –50dBm
Yes
Spectrumanalyzer Antenna Switch output, GSM1900 –88 dBm
No
Spectrumanalyzer Antenna Switch input –84 dBm
No
Check C831, L811
Yes
GSM1900 RX chain functional
Yes
Oscilloscope VANT_3 2.7VV VANT_1/2 0V
No
Oscilloscope Check HELGO serial interface (burst mode)
No
Check Baseband
Yes
Check Antenna switch Z800
Yes
Check HELGO N500
Spectrumanalyzer HELGO inputs GSM1900 -89 dBm
Spectrumanalyzer RX_SAW_out –90 dBm
Check Baseband
Oscilloscope LNA_VCC 2.6V LNA_P 0 V
Oscilloscope VR1,3...6 2.7V Check HELGO serial interface (burst mode)
Check Baseband
Yes
Check V802, C826, Z802, C829, C8097, C808
Yes
Check HELGO N500
All spectrumanalyzer reading values are measured with 1 kohm passive probe (use tweezers to connect the probe ground to the nearest PWB ground). Reading value is represented without +26 dB compensation.
* Spectrumanalyzer reading with 1 kohm passive probe (right value add +26 dB)
Oscilloscope VR1,3...6 2.7V Check HELGO serial interface (burst mode)
Check Baseband
Yes
Spectrumanalyzer 4G VCO out 3920 MHz —30 dBm (*
Synthesiszer troubleshooting
Yes
Check HELGO N500
* ** DC–level of RXI/RXQ in continuous mode will decrease slowly.
The original level can be restored by rewriting gain set.

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Synthesizer

General instructions for synthesizer troubleshooting

Connect test jig to computer with DAU-9S cable or to FPS-8 Flash Prommer with XCS-4 modular cable.

Make sure that you have PKD-1 dongle connected to computers parallel port.

Connect DC power supply or FPS-8 to module test jig with PCS-1 cable.

Set the DC supply voltage to 3.9V and set the jumper connector on test jig to "bypass" position.

Set the phone module to test jig and start Phoenix service sofware

Initialize connection to phone. (use FBUS driver when using DAU-9S and COMBOX driver when using FPS-8)

Select product from the menu

File -> Choose product -> RH-30/RH-31

From toolbar set operating mode to "Local"

Activate RF controls window from the menu

Testing -> RF Controls

From the RF controls window

- Select band "GSM850", "GSM900", "GSM 1800" or "GSM1900" (Default = "GSM900" RH-30, Default= “GSM850” RH-31)
- Set Active unit to "Rx" (Default = "Rx")
- Set Operation mode to "Continuous" (Default = "Burst")
- Set Rx/Tx channel to 190 on GSM850, 37 on GSM900 band, 700 on GSM1800 band, 661 on GSM1900 band (Defaults)

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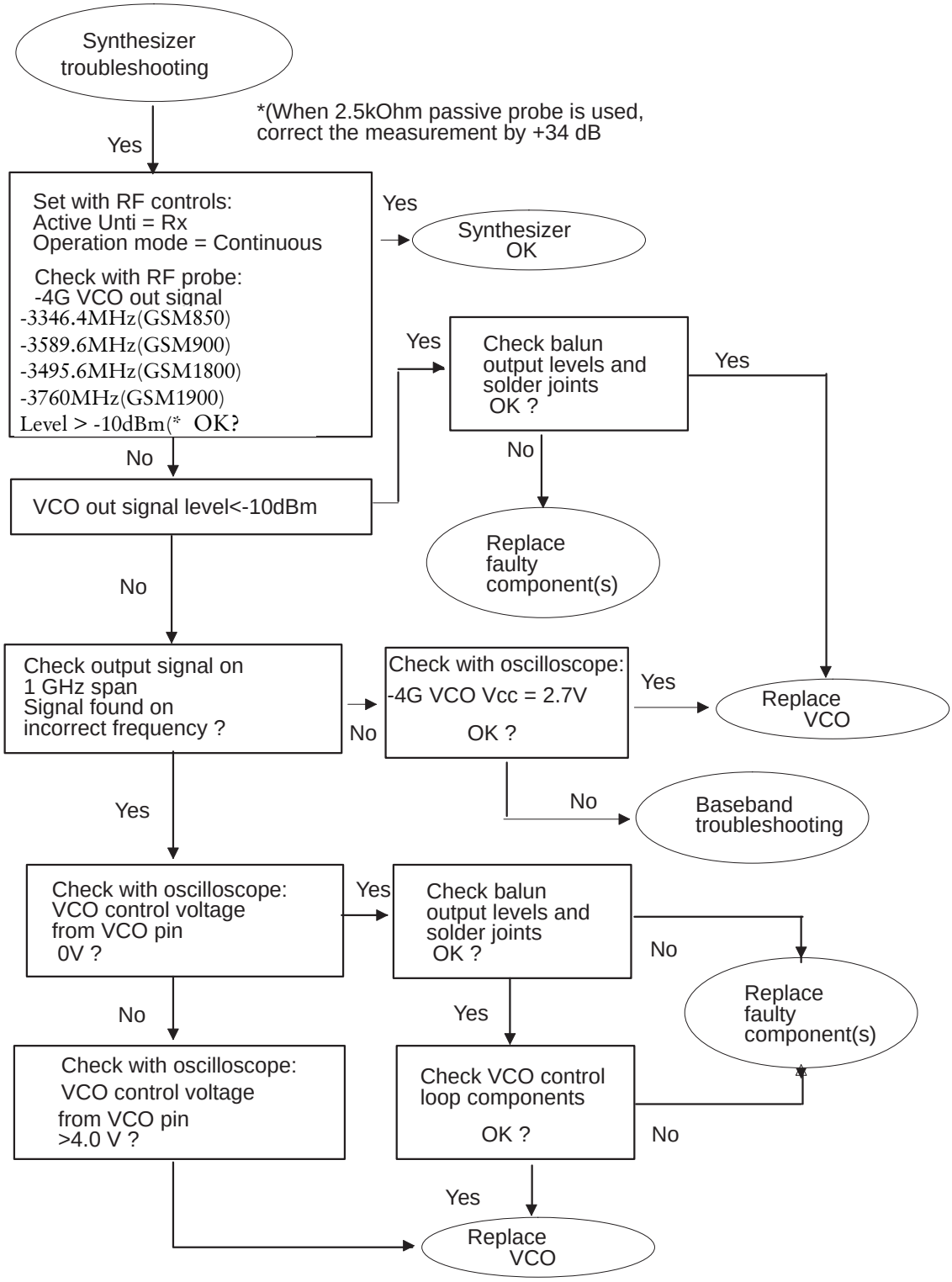
Figure 24: Synthesizer troubleshooting diagram



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Pictures of synthesizer signals

Figure 25: 26MHz at G501 pin out

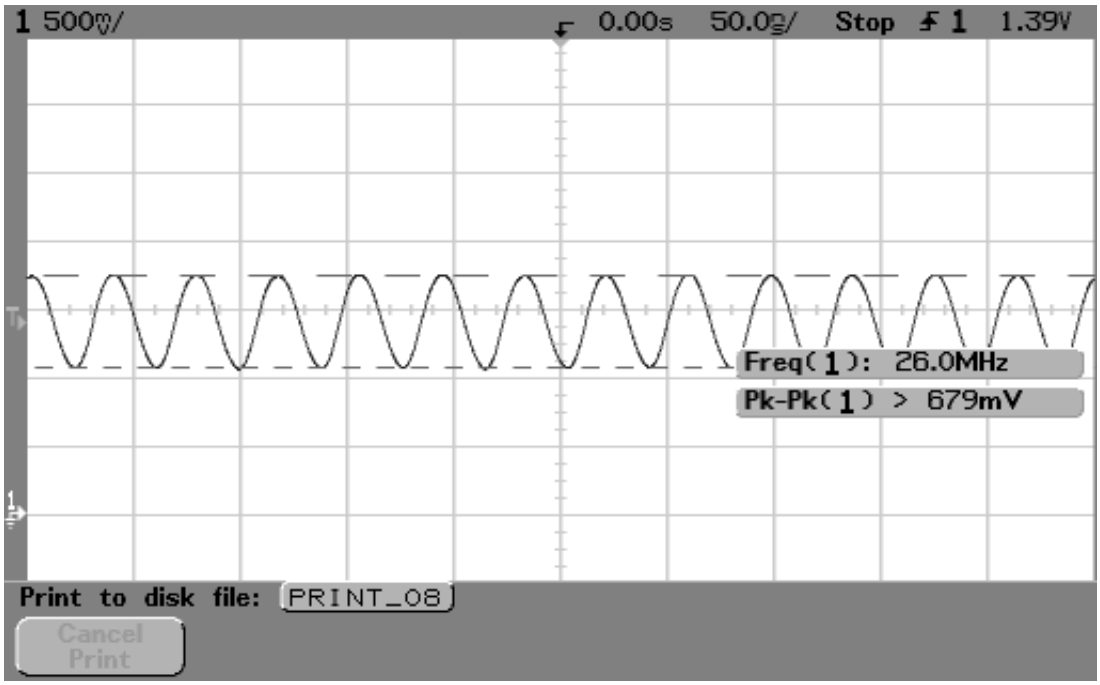

Figure 26: 26MHz RFCLK at R420/C420

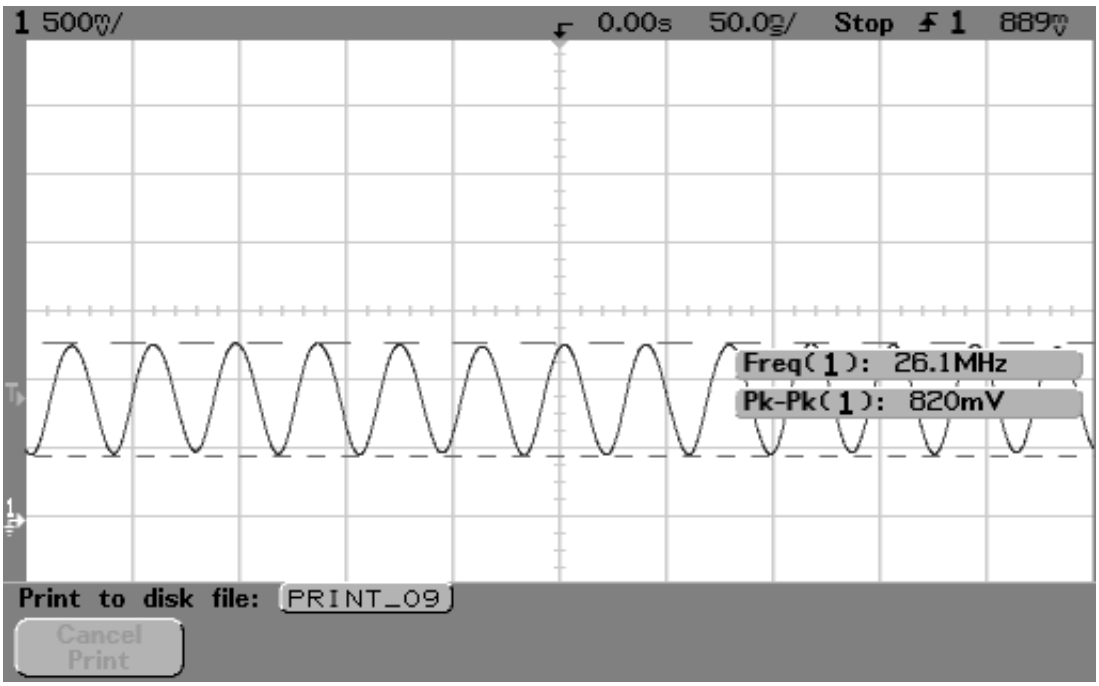

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Figure 27: 1800 TX, channel 512, burst mode

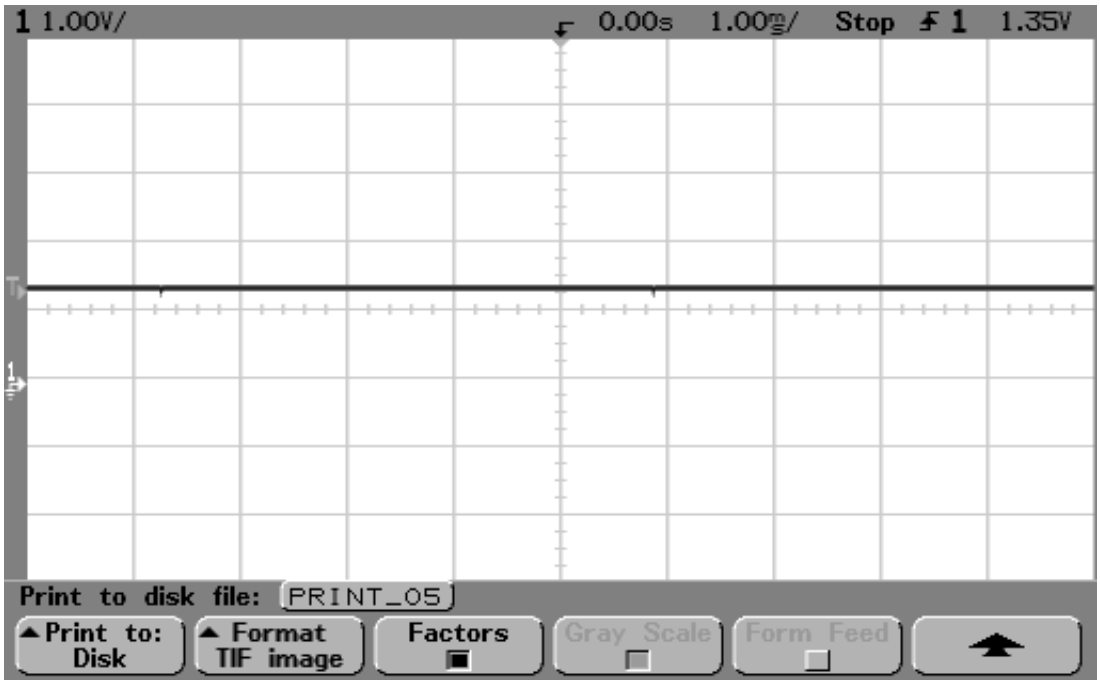

Figure 28: 1900 RX, channel 810, continuous mode

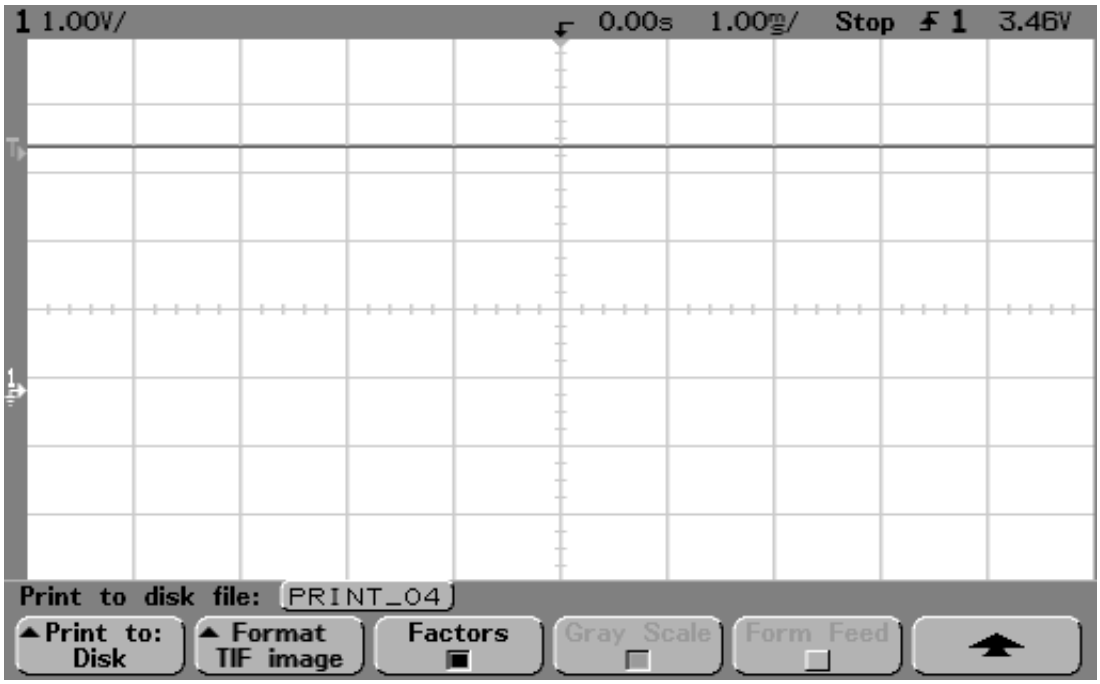

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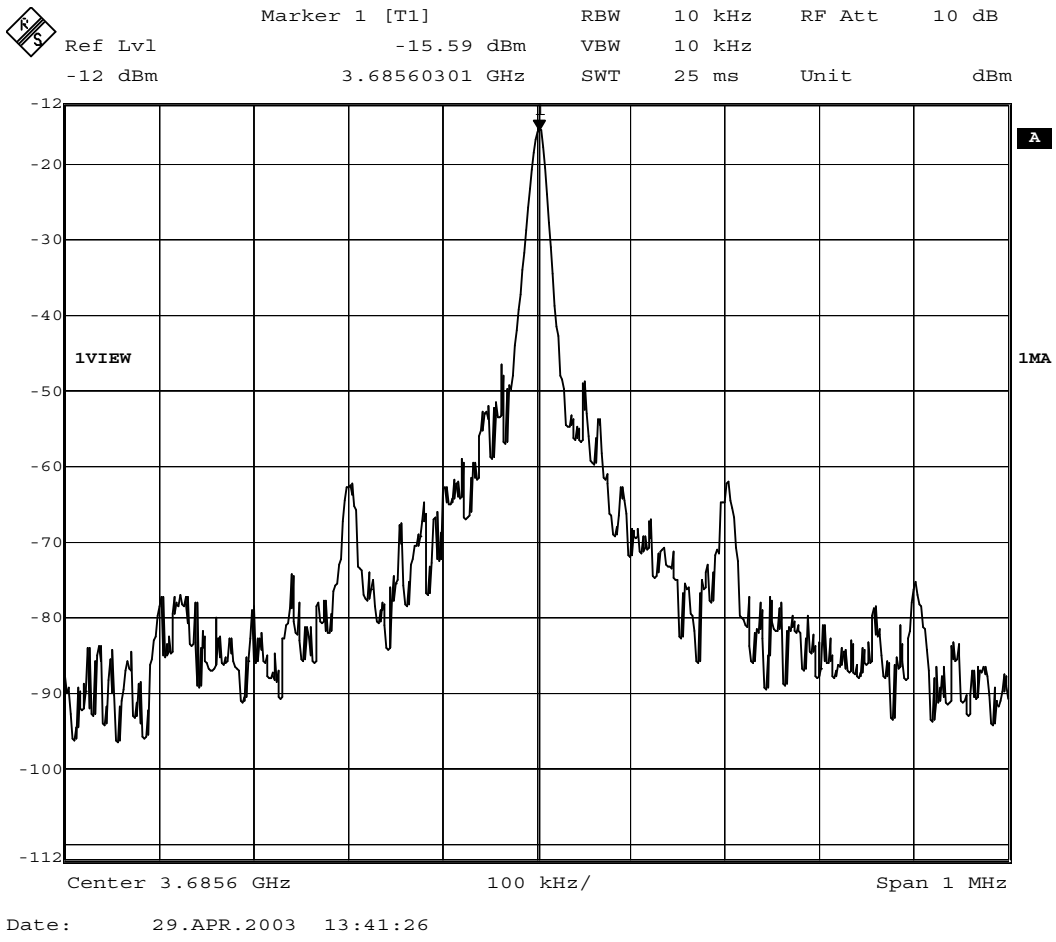
Figure 29: VCO output, 1800 band, ch700, RX on, continuous output



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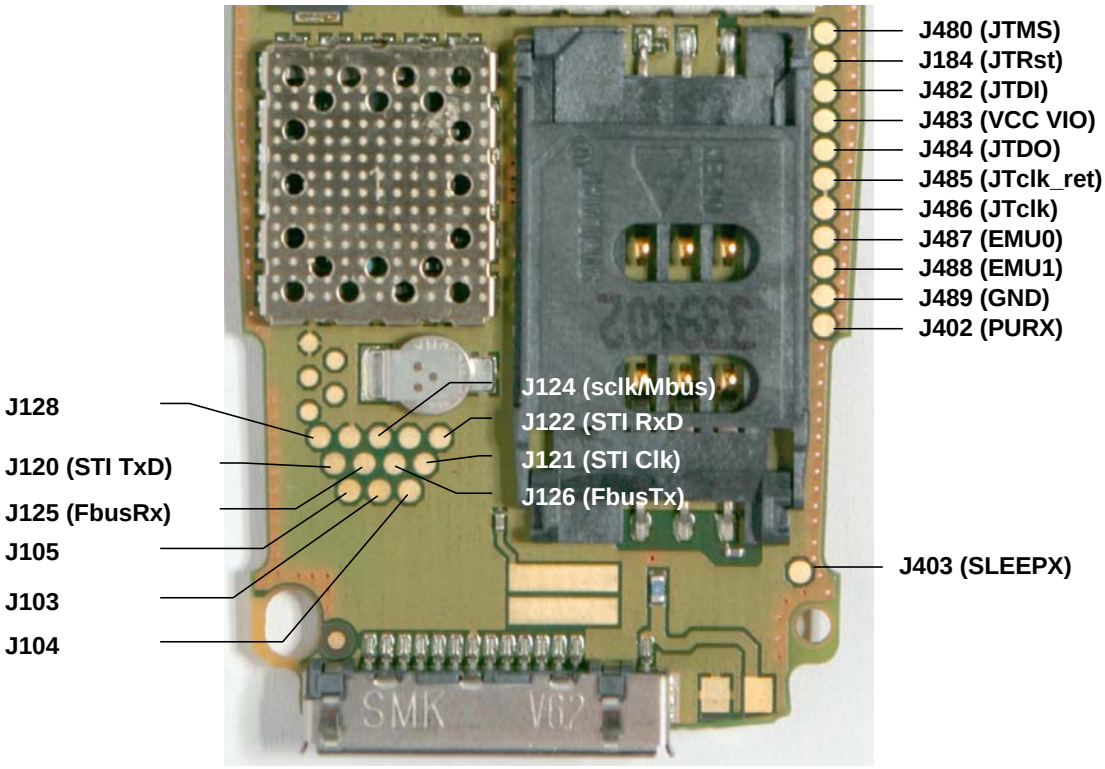
Baseband Troubleshooting

Figure 31: Basic baseband test points



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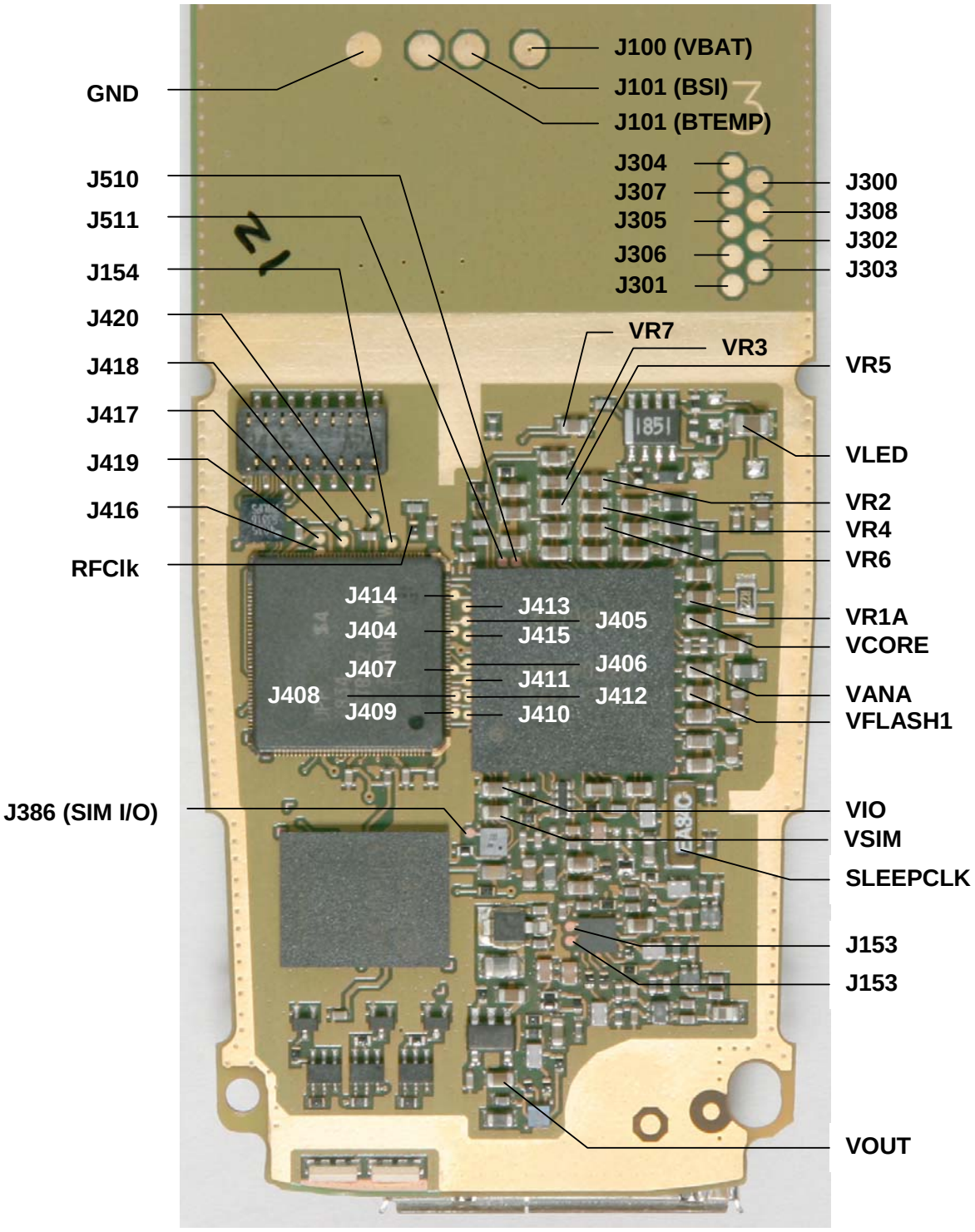

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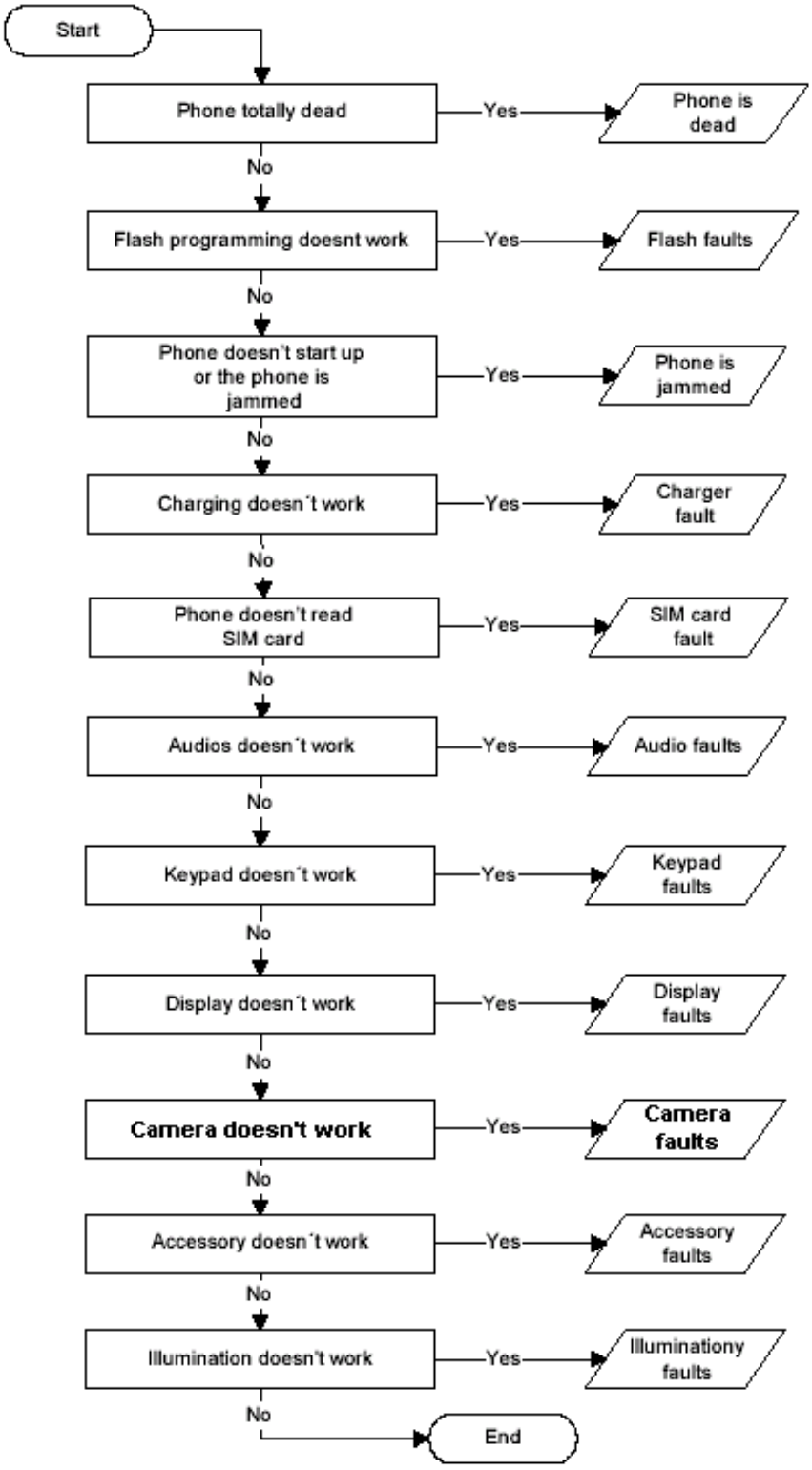
The following diagrams describe baseband troubleshooting.

Main troubleshooting diagram

Figure 32: Baseband general troubleshooting



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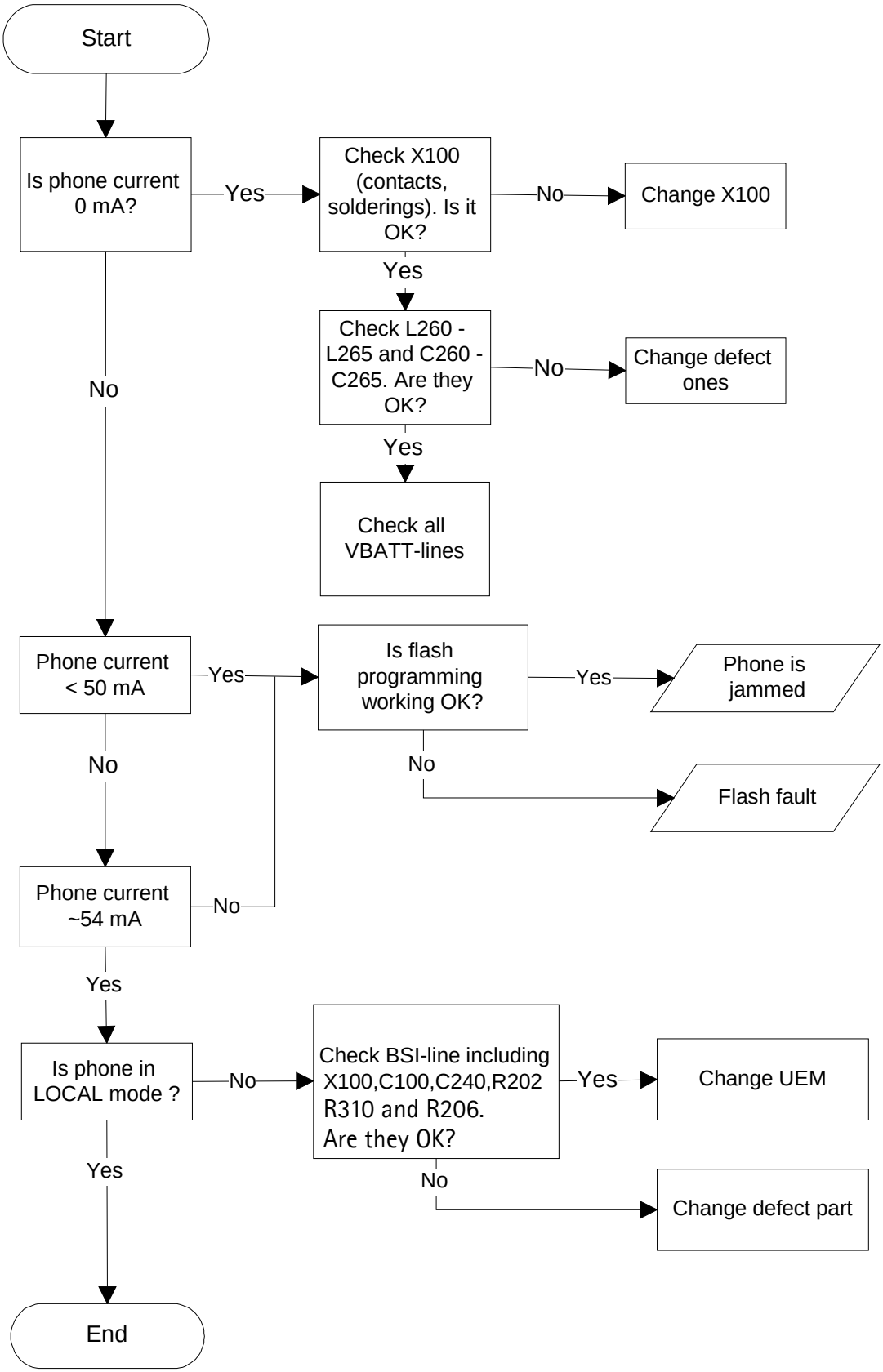
Phone is dead

Figure 33: Dead phone troubleshooting



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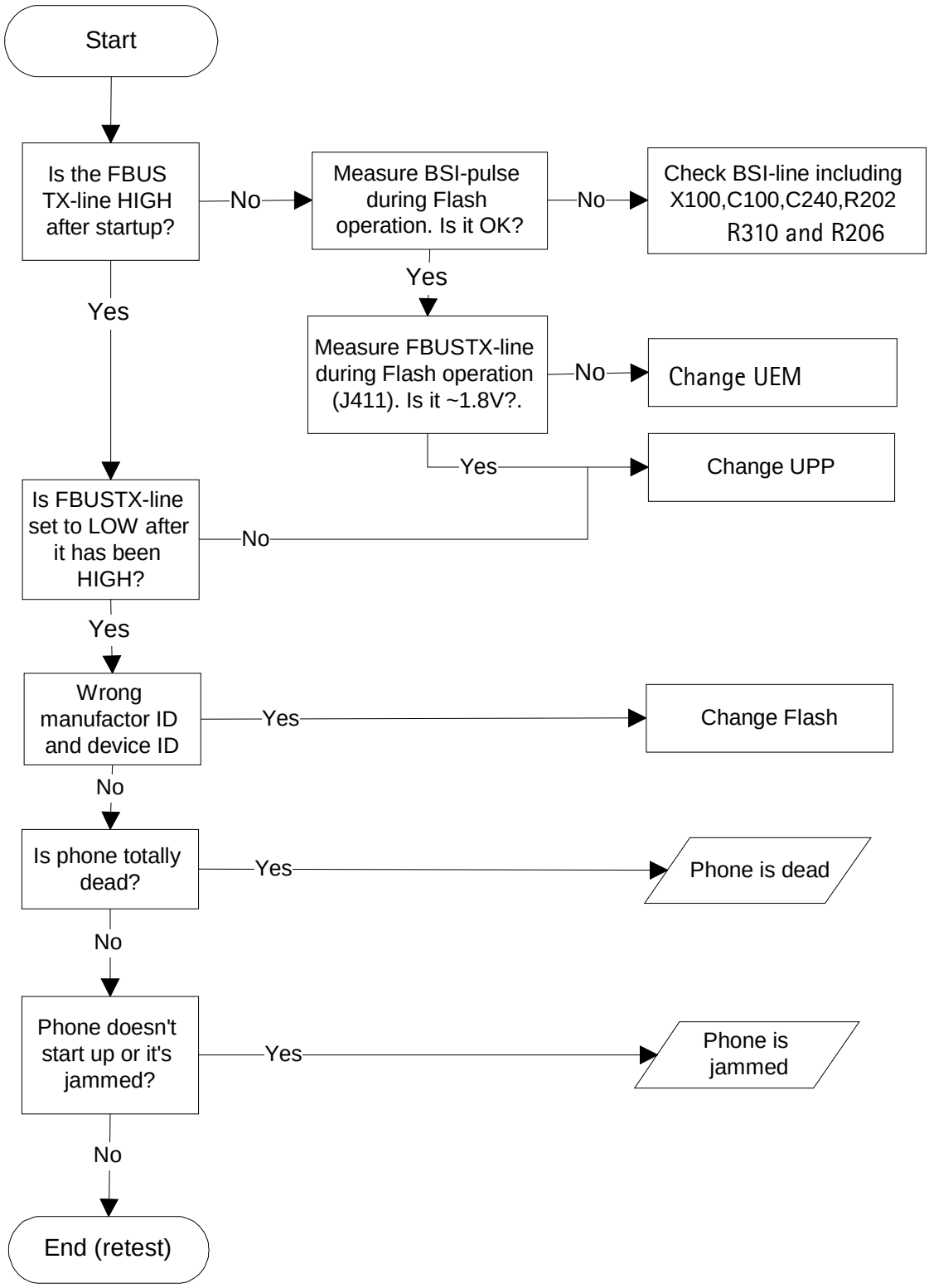
Flash programming fault

Figure 34: Flash programming troubleshooting



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Phone is jammed

Figure 35: Jammed phone troubleshooting (1)

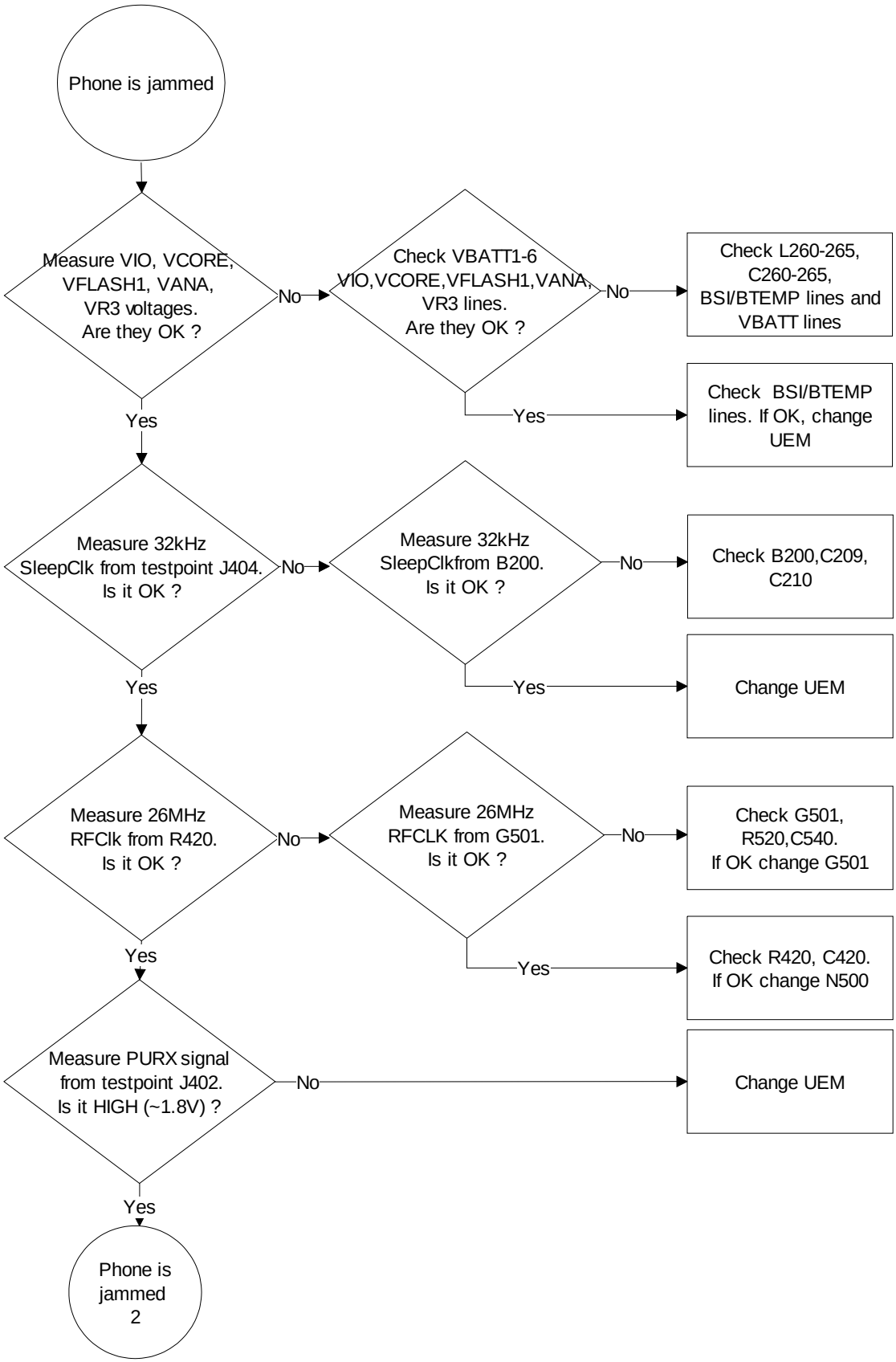
Phone is jammed
Measure VIO, VCORE, VFLASH1, VANA, VR3 voltages. Are they OK ?
No
Check VBATT1-6 VIO,VCORE,VFLASH1,VANA, VR3 lines. Are they OK ?
No
Check L260-265, C260-265, BSI/BTEMP lines and VBATT lines
Yes
Check BSI/BTEMP lines. If OK, change UEM
Yes
Measure 32kHz SleepClk from testpoint J404. Is it OK ?
No
Measure 32kHz SleepClkfrom B200. Is it OK ?
No
Check B200,C209, C210
Yes
Change UEM
Yes
Measure 26MHz RFClk from R420. Is it OK ?
No
Measure 26MHz RFCLK from G501. Is it OK ?
No
Check G501, R520,C540. If OK change G501
Yes
Check R420, C420. If OK change N500
Yes
Measure PURX signal from testpoint J402. Is it HIGH (~1.8V) ?
No
Change UEM
Yes
Phone is jammed 2

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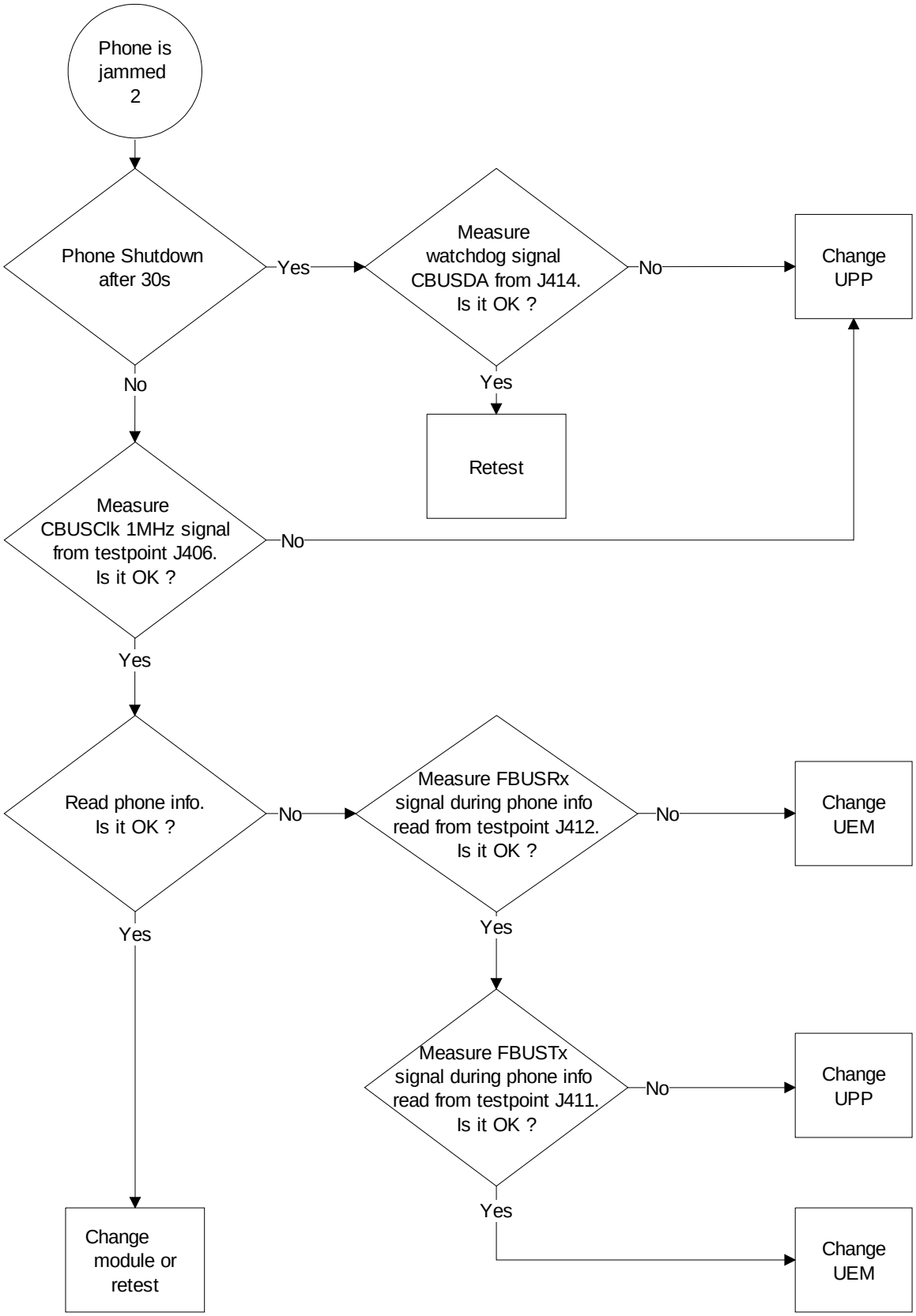
Figure 36: Jammed phone troubleshooting (2)



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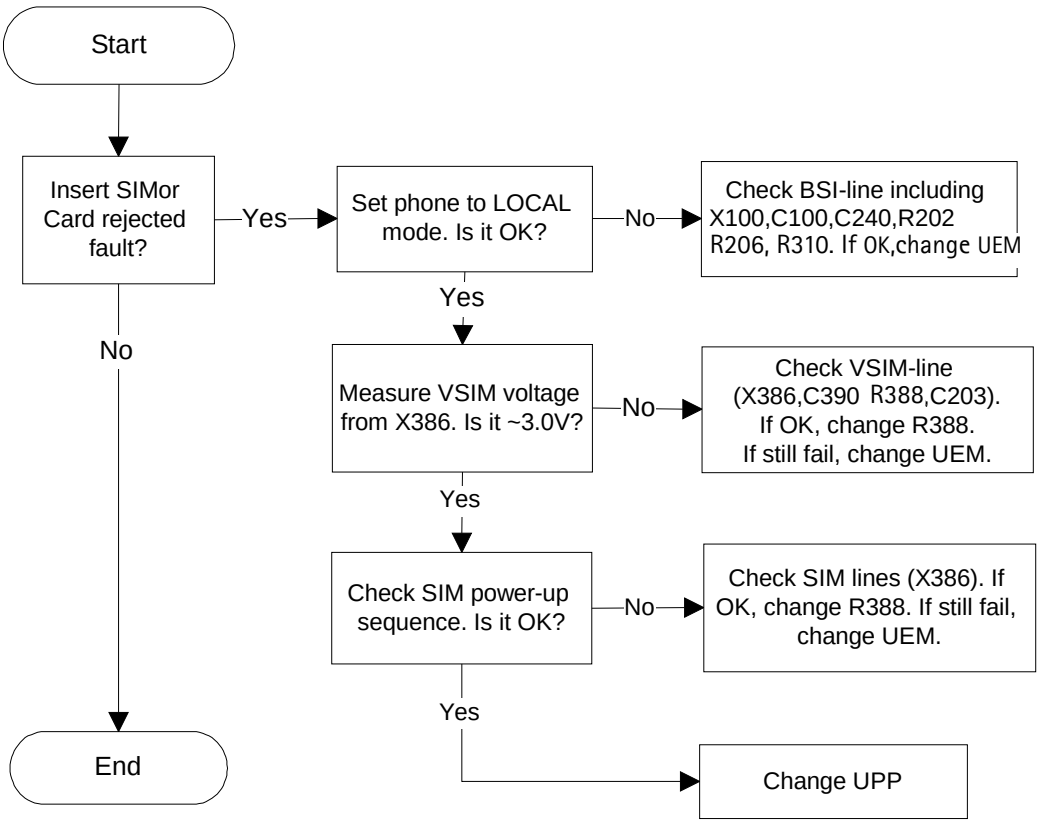
SIM card fault (Insert SIM / Card rejected)

Figure 37: SIM card troubleshooting


Start
Insert SIMor Card rejected fault?
Yes
Set phone to LOCAL mode. Is it OK?
No
Check BSI-line including X100,C100,C240,R202 R206, R310. If OK,change UEM
Yes
No
Measure VSIM voltage from X386. Is it ~3.0V?
No
Check VSIM-line (X386,C390 R388,C203). If OK, change R388. If still fail, change UEM.
Yes
Check SIM power-up sequence. Is it OK?
No
Check SIM lines (X386). If OK, change R388. If still fail, change UEM.
Yes
End
Change UPP

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Keypad fault

Figure 38: Keypad troubleshooting (1)

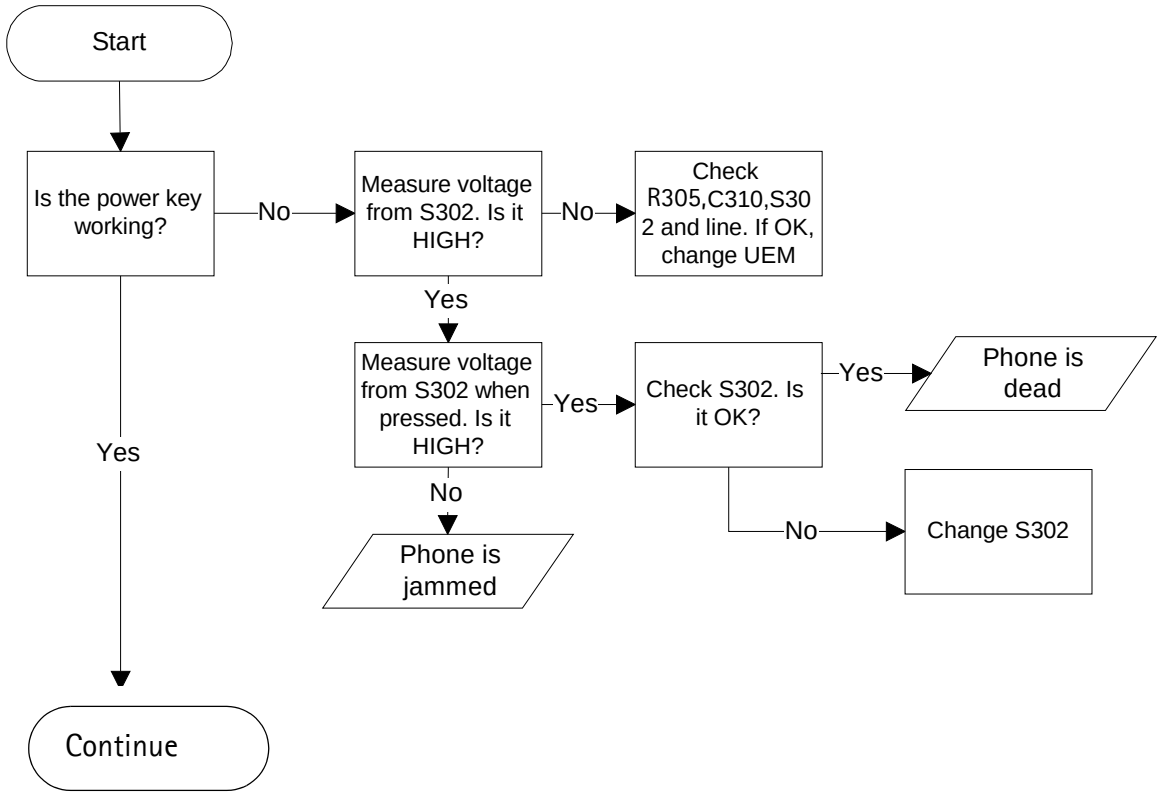

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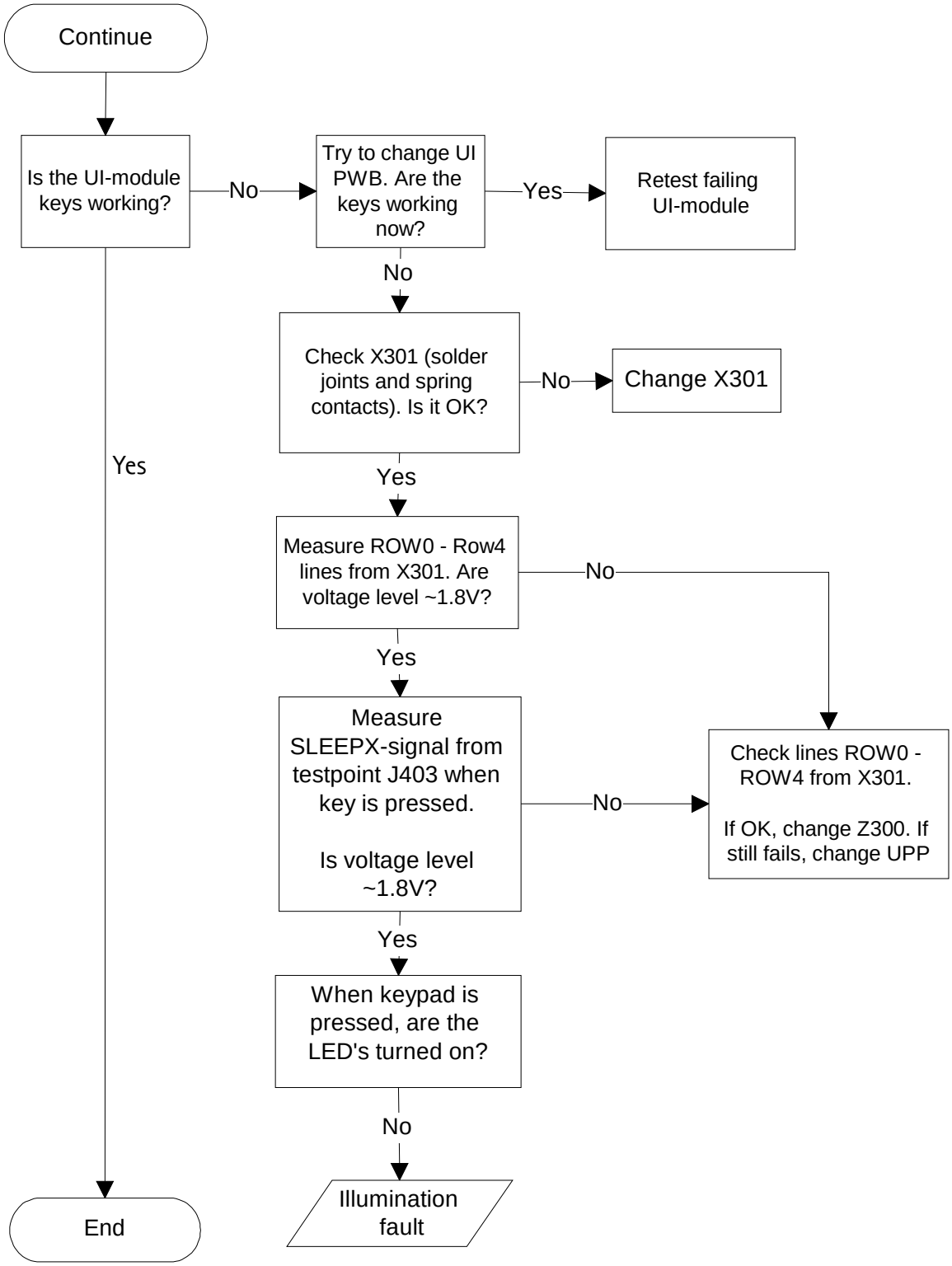
Figure 39: Keypad troubleshooting (2)



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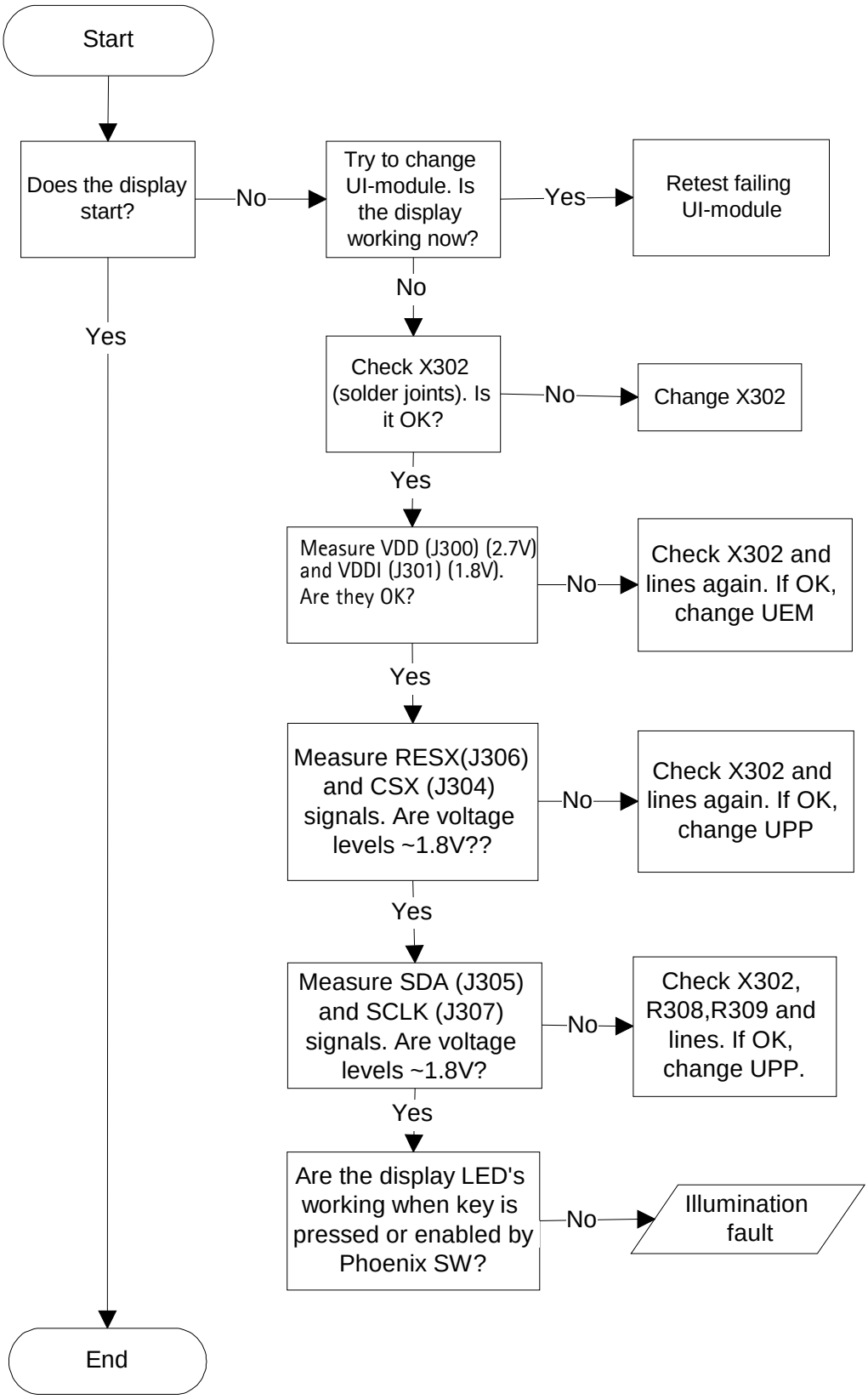
Display fault

Figure 40: Display troubleshooting


Start
Does the display start?
No
Try to change UI-module. Is the display working now?
Yes
Retest failing UI-module
No
Yes
Check X302 (solder joints). Is it OK?
No
Change X302
Yes
Measure VDD (J300) (2.7V) and VDDI (J301) (1.8V). Are they OK?
No
Check X302 and lines again. If OK, change UEM
Yes
Measure RESX(J306) and CSX (J304) signals. Are voltage levels ~1.8V??
No
Check X302 and lines again. If OK, change UPP
Yes
Measure SDA (J305) and SCLK (J307) signals. Are voltage levels ~1.8V?
No
Check X302, R308,R309 and lines. If OK, change UPP.
Yes
Are the display LED's working when key is pressed or enabled by Phoenix SW?
No
Illumination fault
End

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Illumination fault

Figure 41: Illumination fault troubleshooting 1

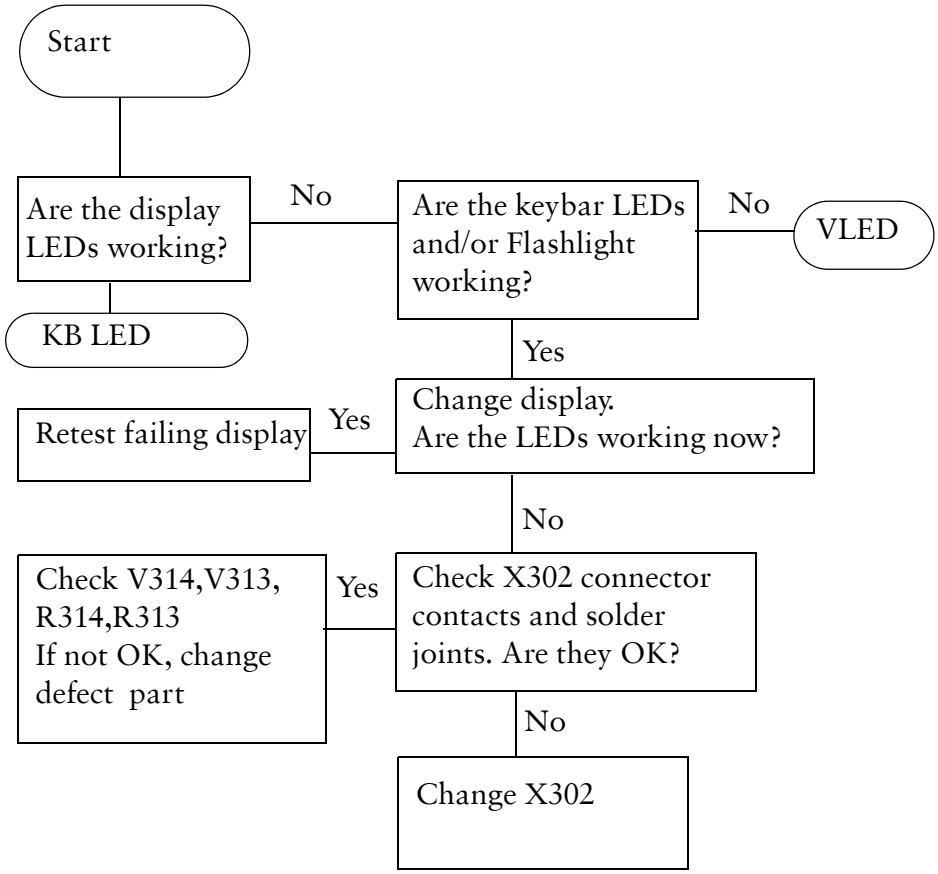

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Figure 42: Illumination fault troubleshooting 2

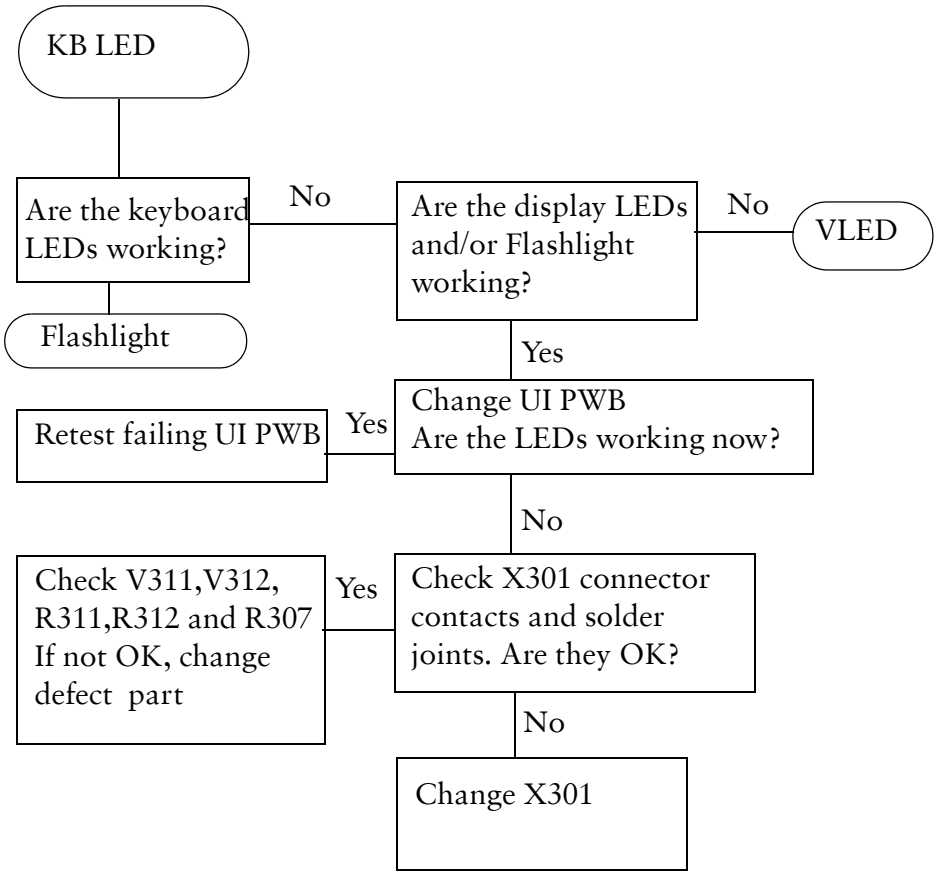

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Figure 43: Illumination fault troubleshooting 3

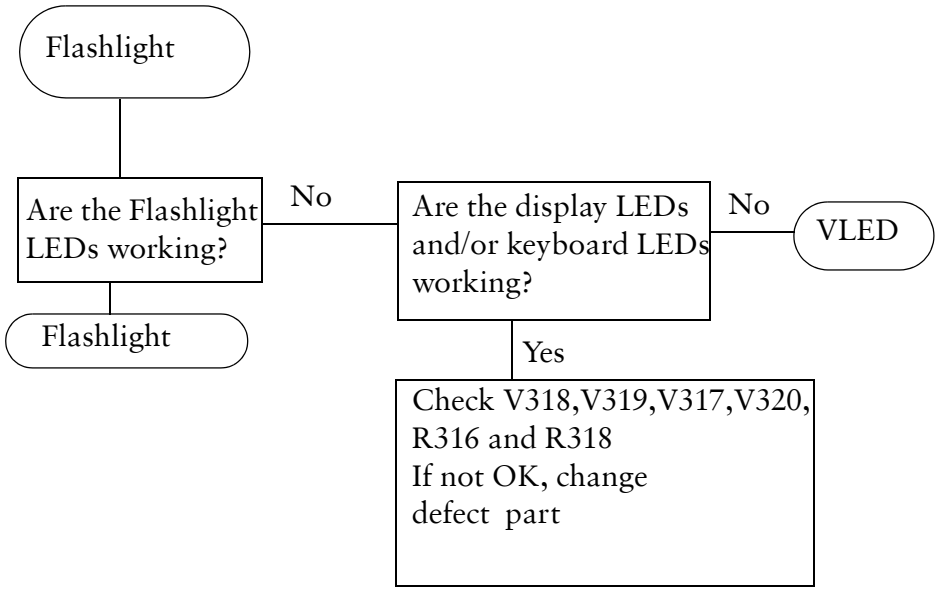

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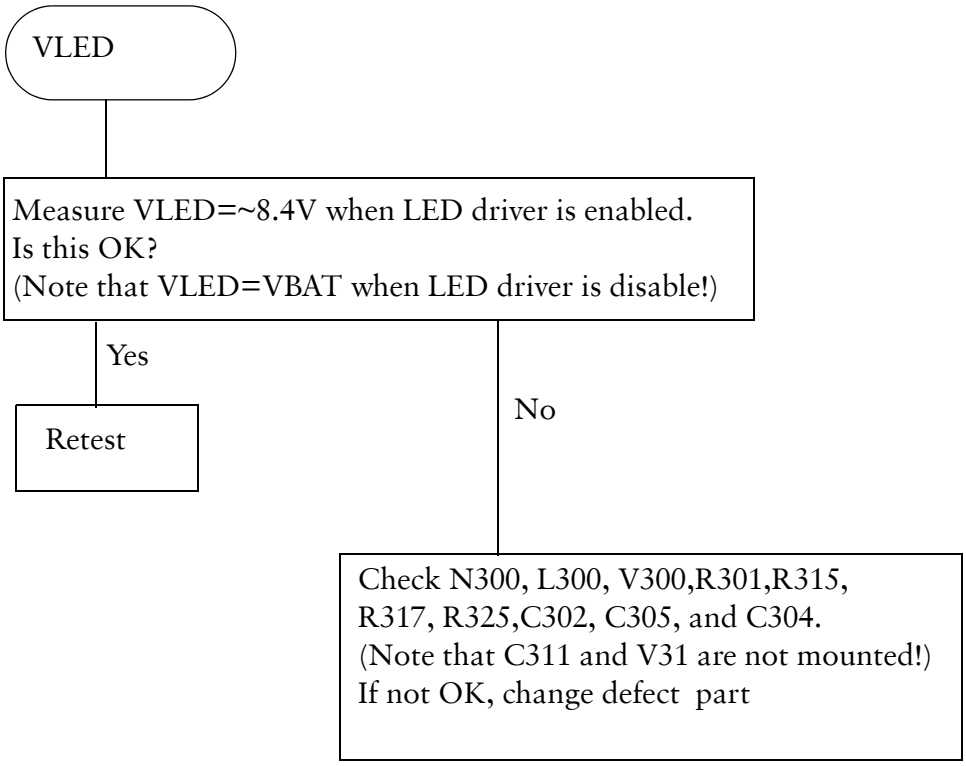
Figure 44: Illumination fault troubleshooting 4


VLED
Measure VLED=~8.4V when LED driver is enabled.
Is this OK?
(Note that VLED=VBAT when LED driver is disable!)
Yes
No
Retest
Check N300, L300, V300,R301,R315,
R317, R325,C302, C305, and C304.
(Note that C311 and V31 are not mounted!)
If not OK, change defect part

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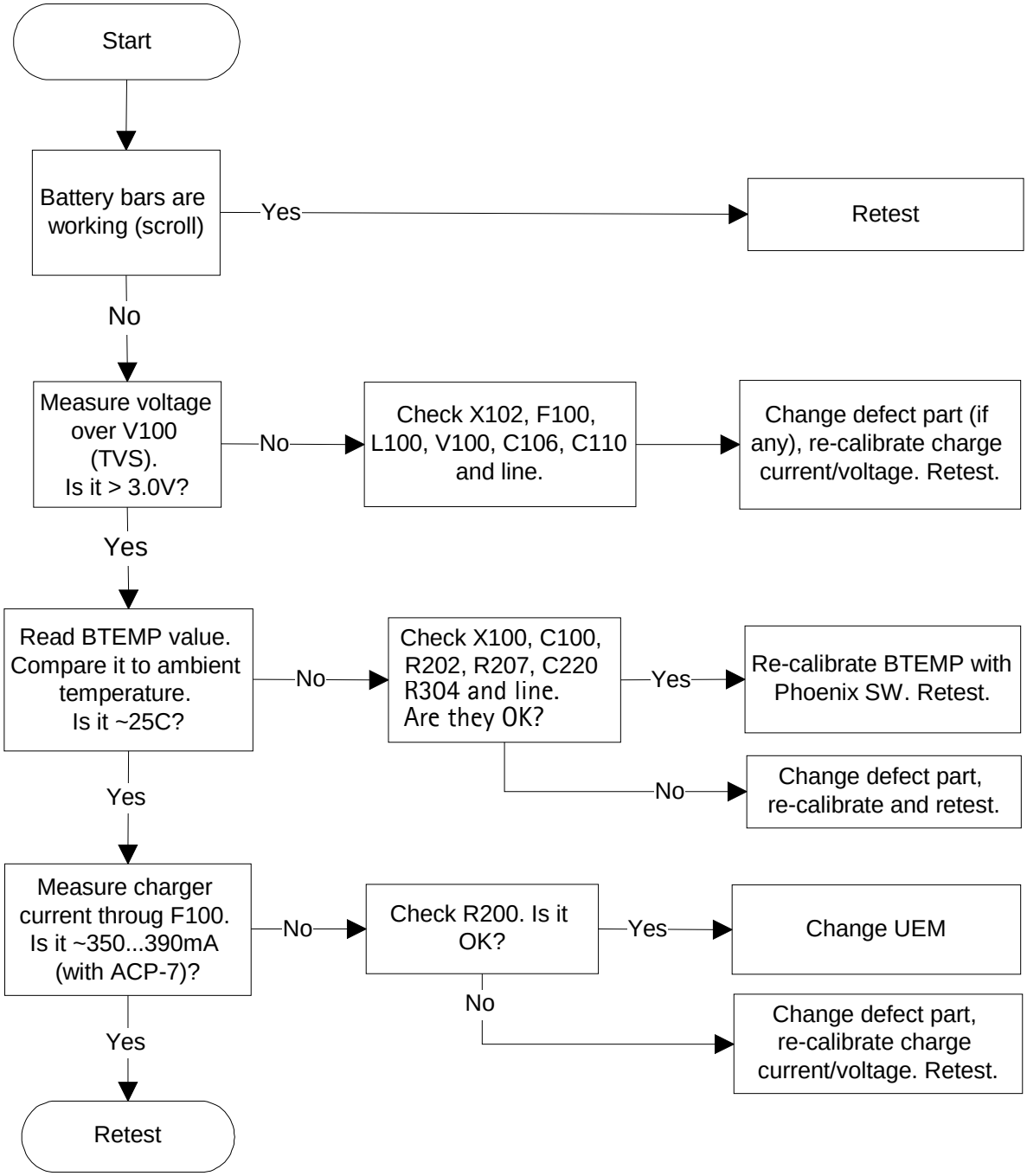
Charger fault

Figure 45: Charging troubleshooting



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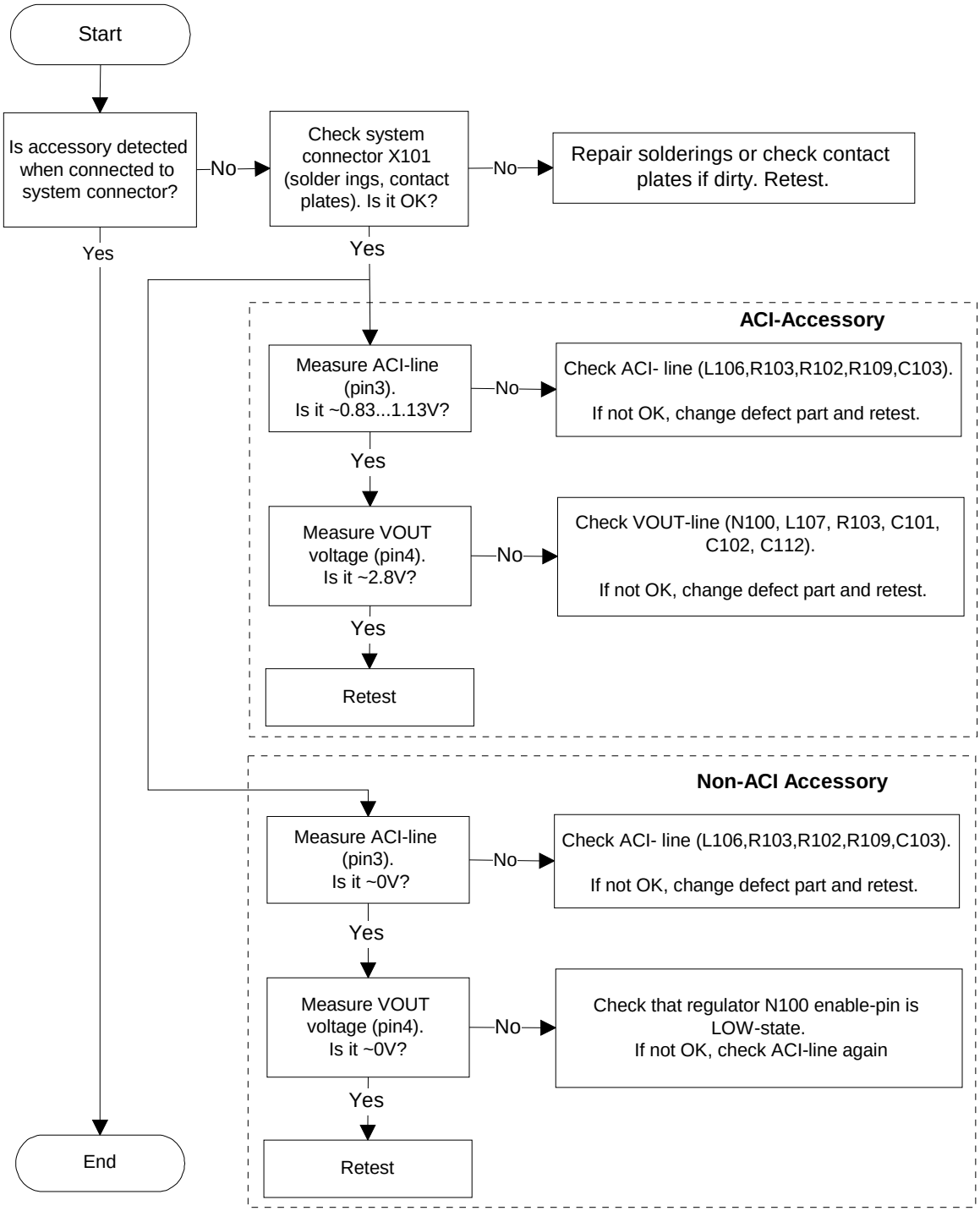
Accessory fault

Figure 46: Accessory troubleshooting



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Audio fault

Figure 47: Audio troubleshooting (1)

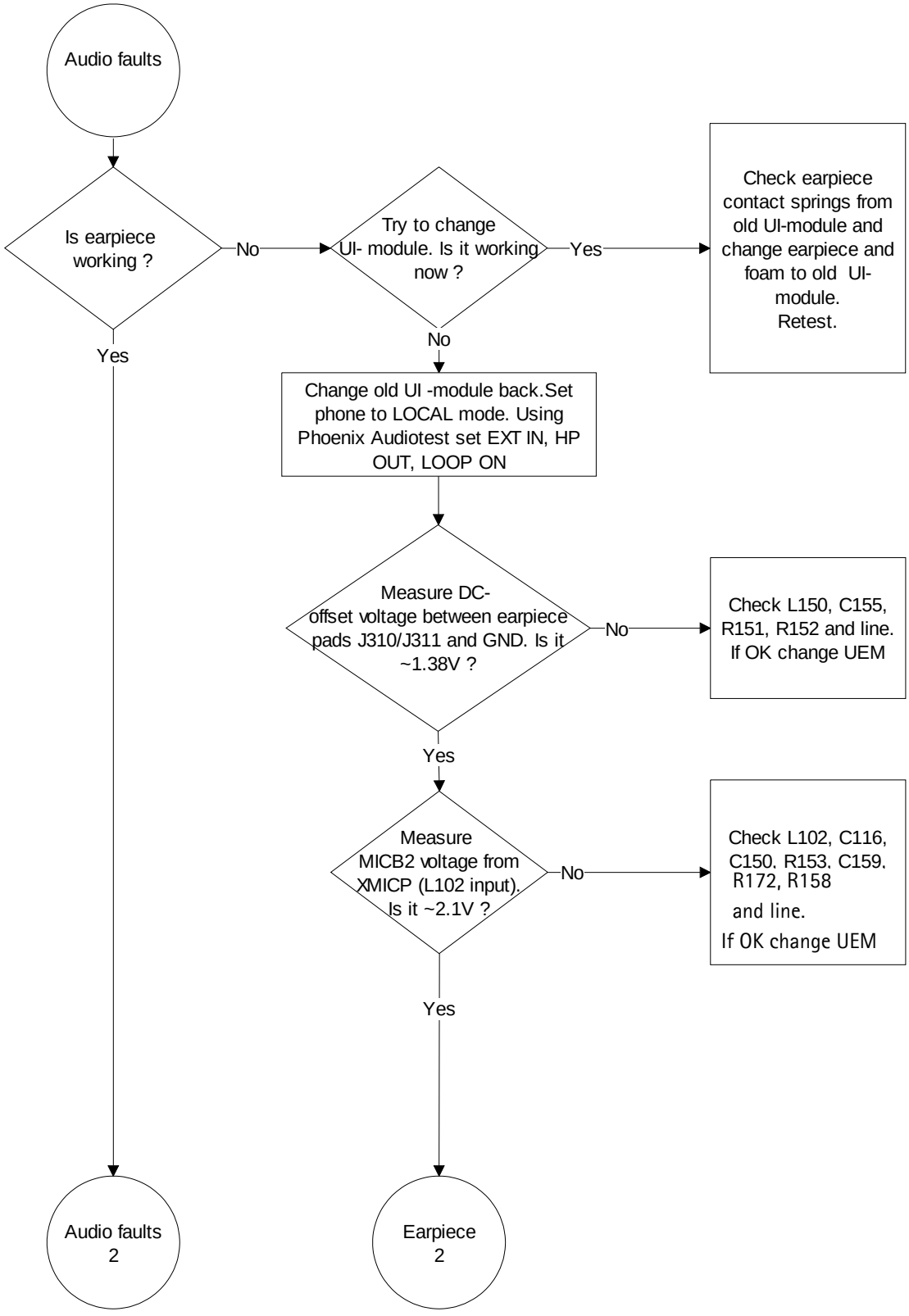
Audio faults
Is earpiece working ?
No
Try to change UI- module. Is it working now ?
Yes
Check earpiece contact springs from old UI-module and change earpiece and foam to old UI-module. Retest.
No
Yes
Change old UI -module back.Set phone to LOCAL mode. Using Phoenix Audiotest set EXT IN, HP OUT, LOOP ON
Measure DC-offset voltage between earpiece pads J310/J311 and GND. Is it ~1.38V ?
No
Check L150, C155, R151, R152 and line. If OK change UEM
Yes
Measure MICB2 voltage from XMICP (L102 input). Is it ~2.1V ?
No
Check L102, C116, C150, R153, C159, R172, R158 and line. If OK change UEM
Yes
Audio faults 2
Earpiece 2

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Figure 48: Audio troubleshooting (2)

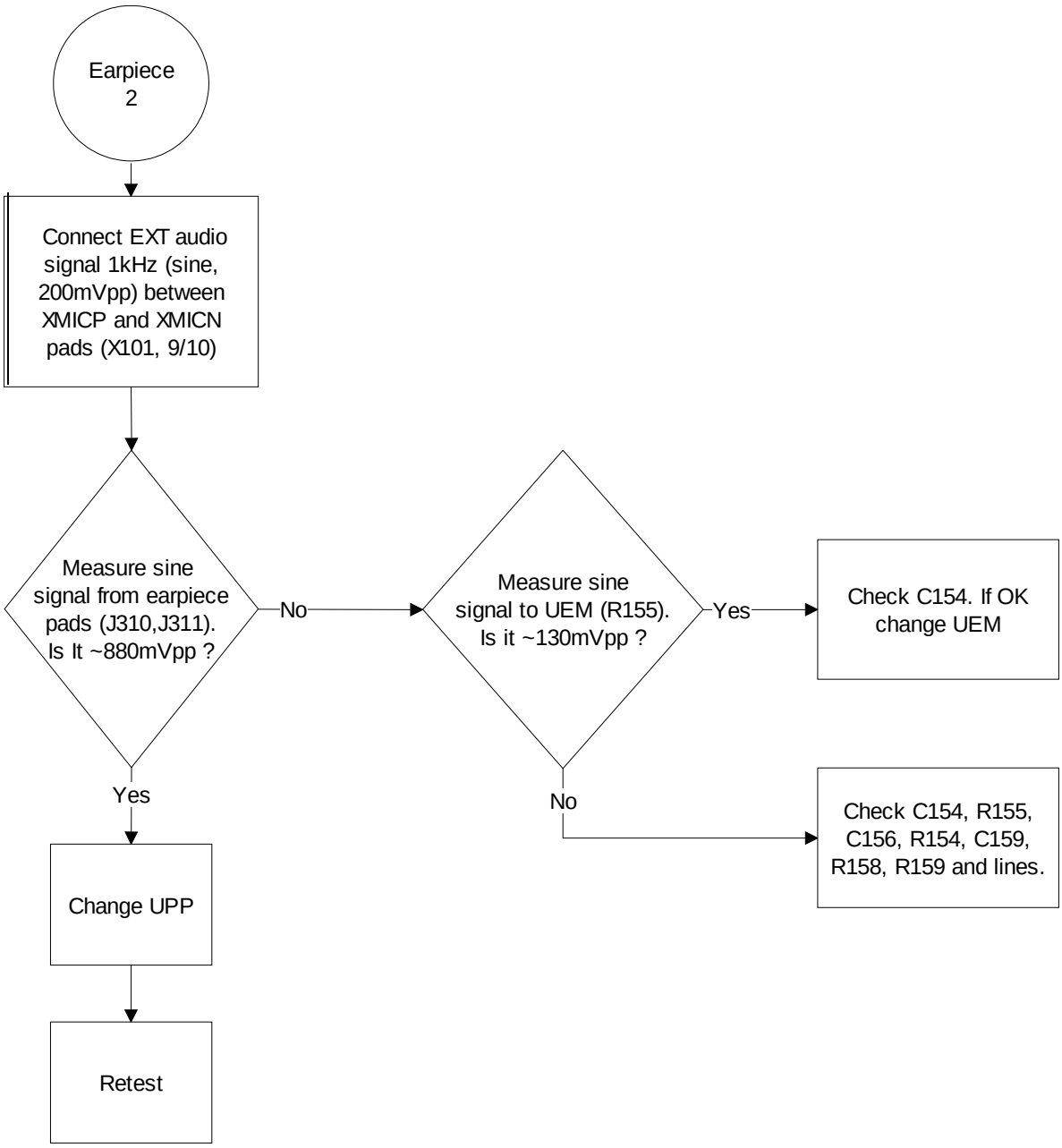
Earpiece 2
Connect EXT audio signal 1kHz (sine, 200mVpp) between XMICP and XMICN pads (X101, 9/10)
Measure sine signal from earpiece pads (J310,J311). Is It ~880mVpp ?
No
Measure sine signal to UEM (R155). Is it ~130mVpp ?
Yes
Check C154. If OK change UEM
Yes
Change UPP
Retest
No
Check C154, R155, C156, R154, C159, R158, R159 and lines.

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Figure 49: Audio troubleshooting (3)

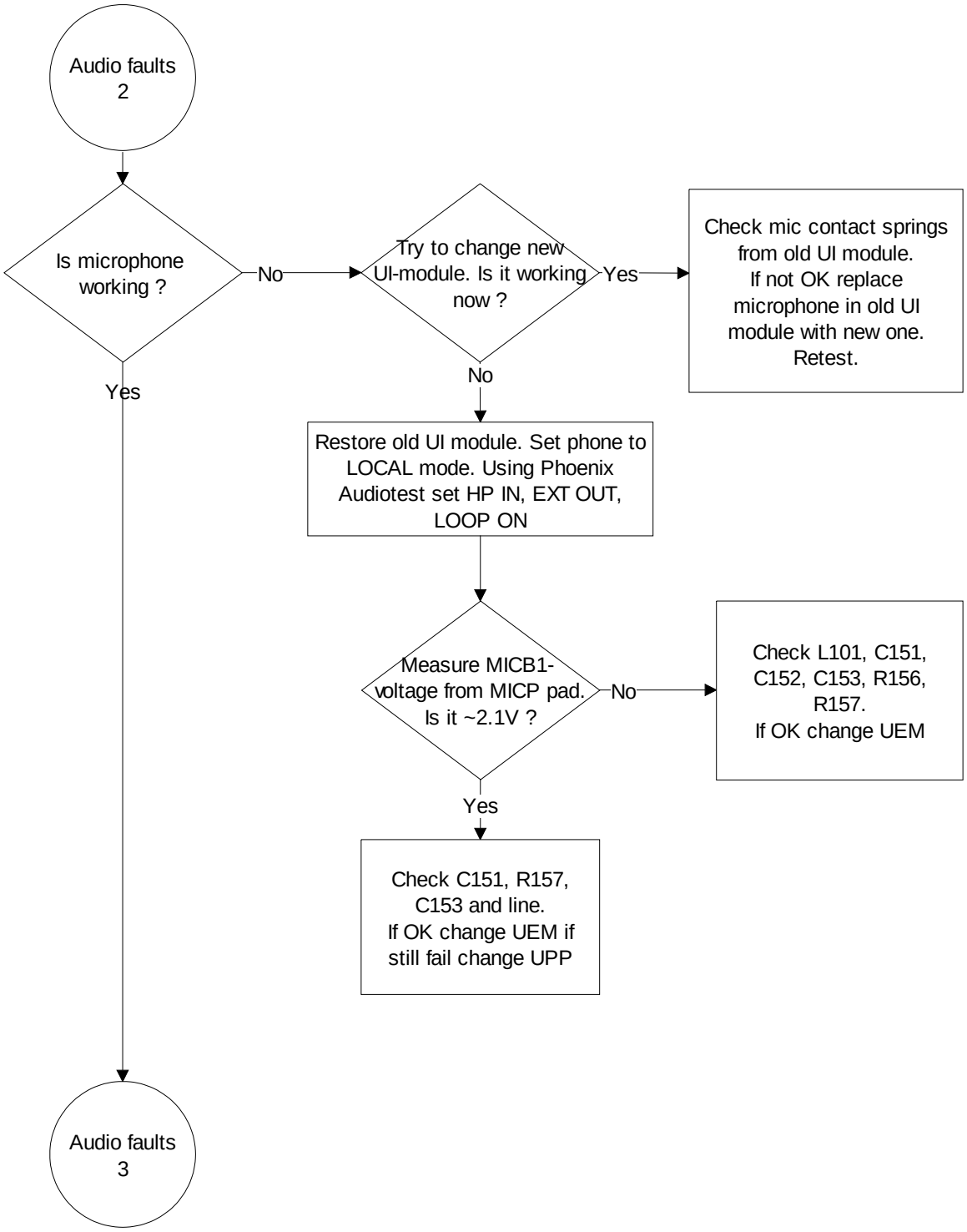
Audio faults 2
Is microphone working ?
No
Try to change new UI-module. Is it working now ?
Yes
Check mic contact springs from old UI module. If not OK replace microphone in old UI module with new one. Retest.
No
Yes
Restore old UI module. Set phone to LOCAL mode. Using Phoenix Audiotest set HP IN, EXT OUT, LOOP ON
Measure MICB1-voltage from MICP pad. Is it ~2.1V ?
No
Check L101, C151, C152, C153, R156, R157. If OK change UEM
Yes
Check C151, R157, C153 and line. If OK change UEM if still fail change UPP
Audio faults 3

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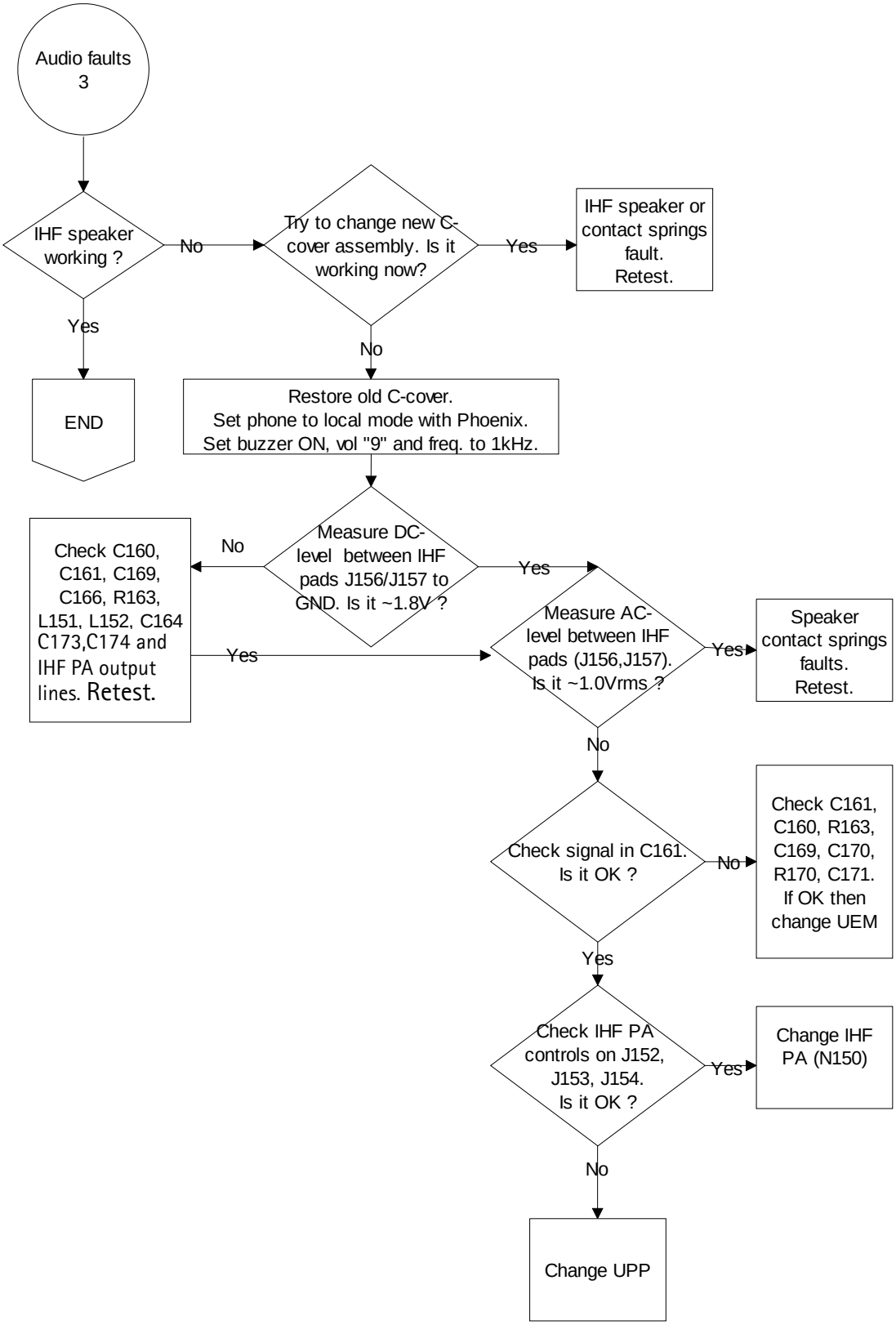
Figure 50: Audio troubleshooting (4)


Audio faults 3
IHF speaker working ?
No
Try to change new C-cover assembly. Is it working now?
Yes
IHF speaker or contact springs fault. Retest.
Yes
END
No
Restore old C-cover. Set phone to local mode with Phoenix. Set buzzer ON, vol "9" and freq. to 1kHz.
Measure DC-level between IHF pads J156/J157 to GND. Is it ~1.8V ?
No
Check C160, C161, C169, C166, R163, L151, L152, C164 C173,C174 and IHF PA output lines. Retest.
Yes
Yes
Measure AC-level between IHF pads (J156,J157). Is it ~1.0Vrms ?
Yes
Speaker contact springs faults. Retest.
No
Check signal in C161. Is it OK ?
No
Check C161, C160, R163, C169, C170, R170, C171. If OK then change UEM
Yes
Check IHF PA controls on J152, J153, J154. Is it OK ?
Yes
Change IHF PA (N150)
No
Change UPP

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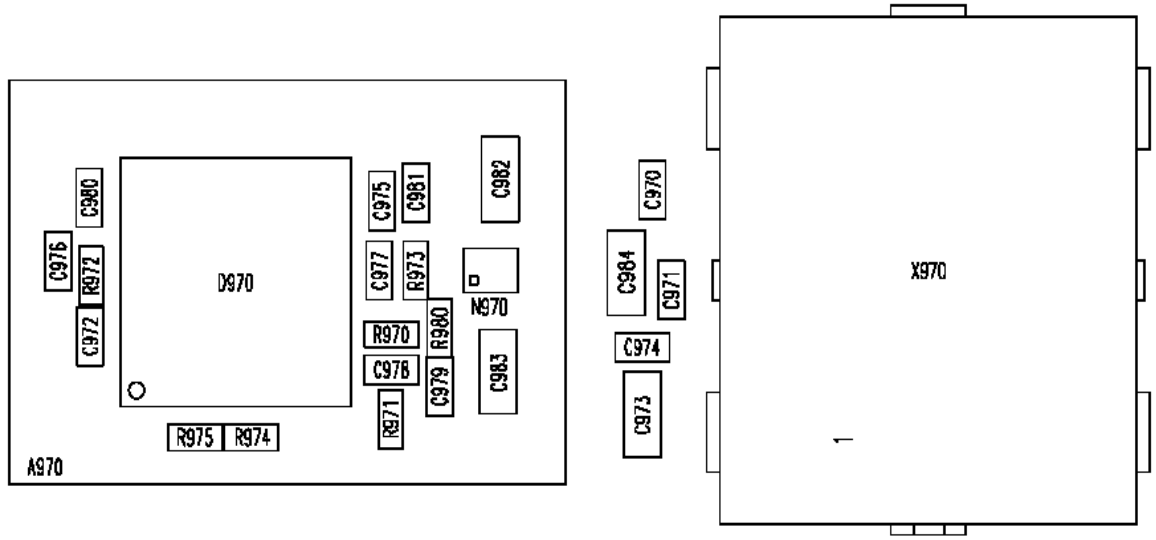
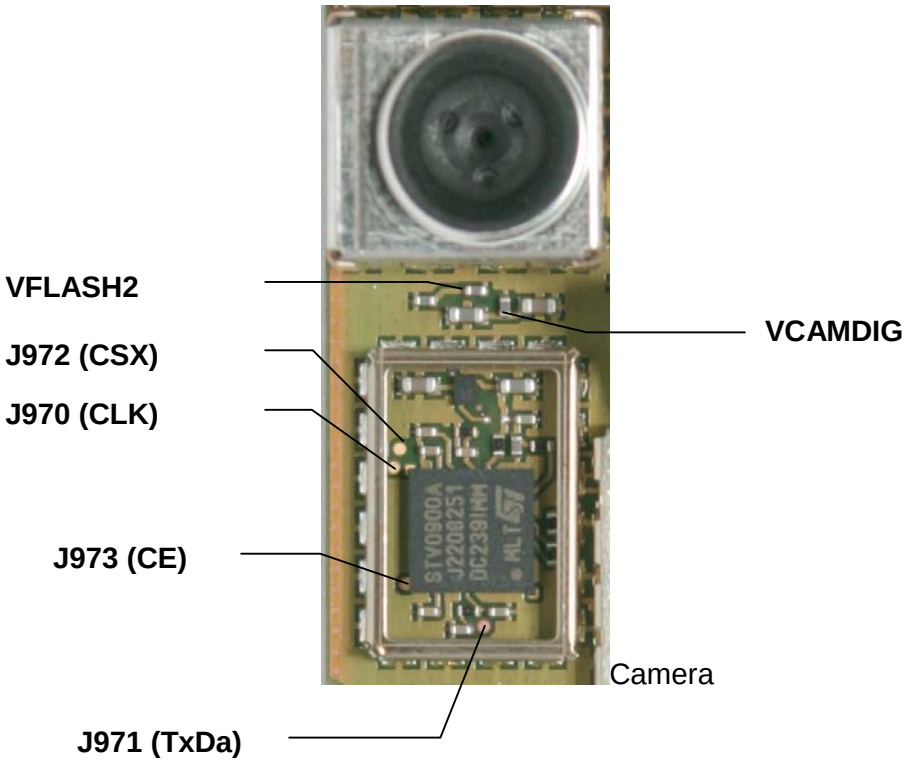
Camera Troubleshooting

Figure 51: Component placement





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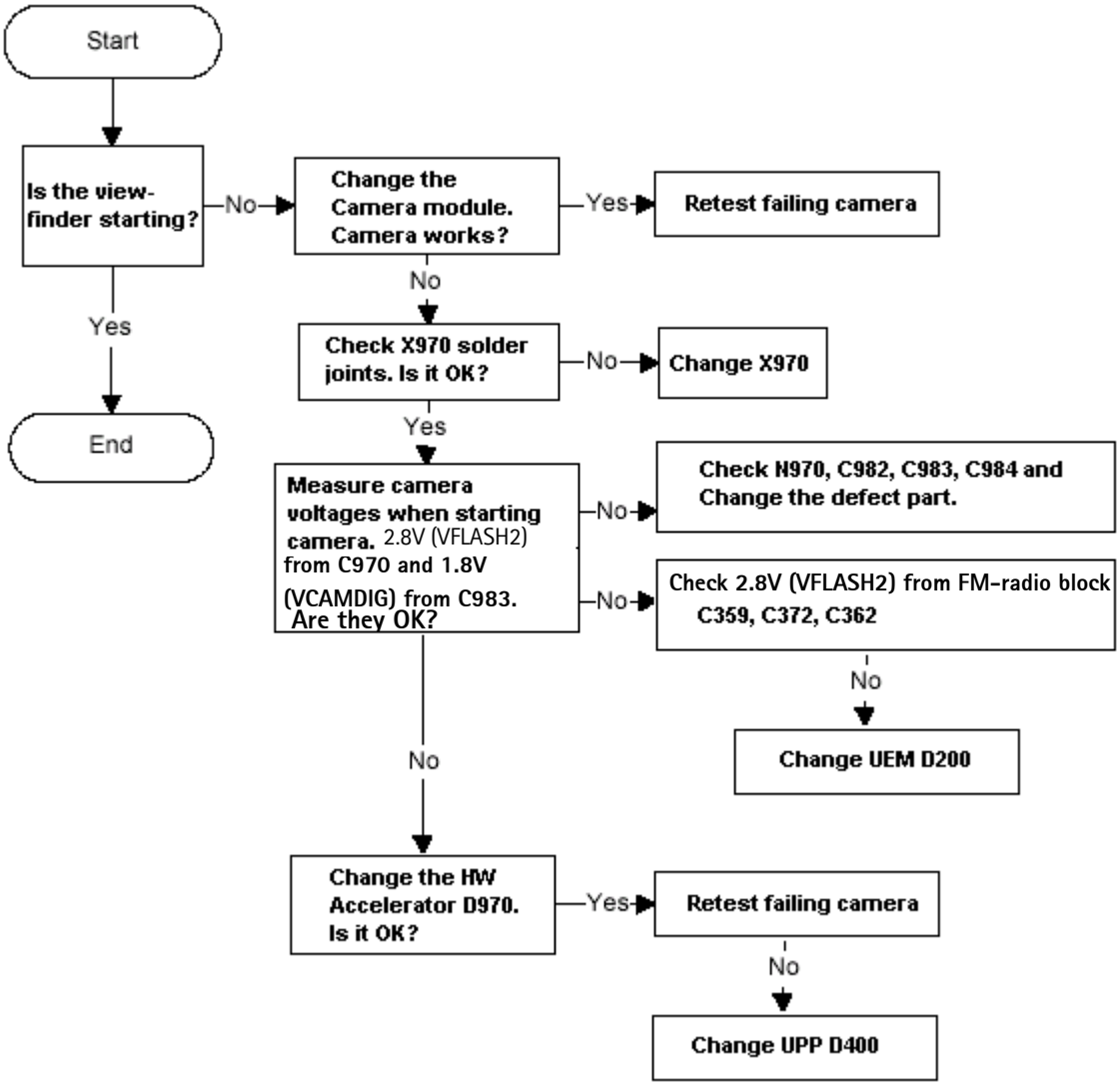
Camera fault

Figure 52: Camera troubleshooting diagram



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FM Radio Troubleshooting

Figure 53: FM Radio Component layout

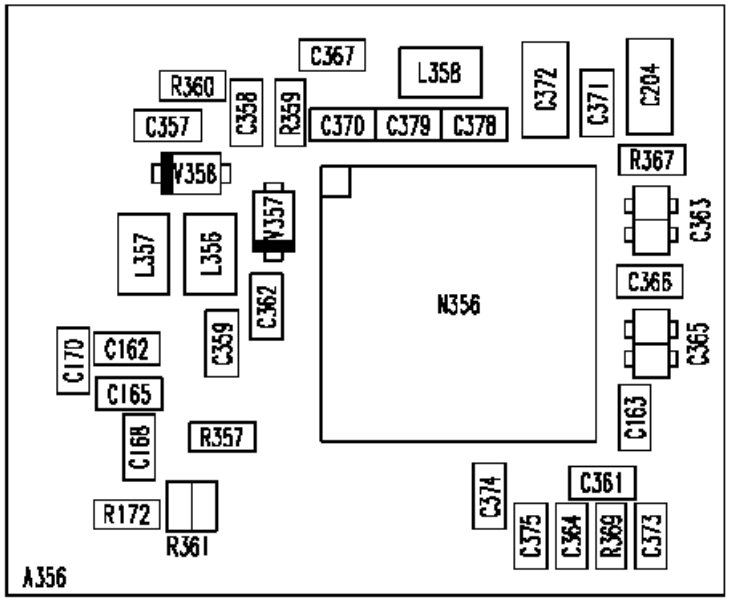
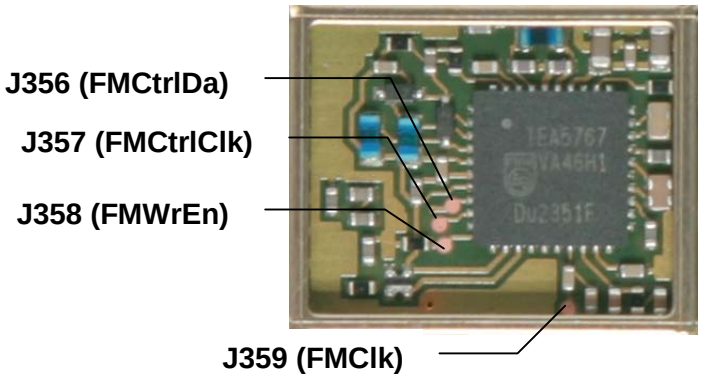


Figure 54: FM radio block layout.



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Components L103, L104, L105, C107, C108, C109, C117, C162, C163, R164, R165, R166 and R167 are not shown in the picture. Those components are placed in baseband section, near audio amplifier N150.

FM radio troubleshooting diagram

Notes to "FM Radio troubleshooting diagram"

Use 1MHz 1X probe when measuring Audio and clock signals with oscilloscope.

Use active RF probe when measuring frequencies with spectrum analyzer.

Note 1. RF test signal parameters:

- Amplitude, A, –67.0 dBm
- Carrier frequency, f_c, 98,000 MHz
- Deviation, Δf, 75 kHz
- Modulating frequency f_m, 1,000 kHz (RF generator internal)
- FM stereo, mode R=L, pilot state ON

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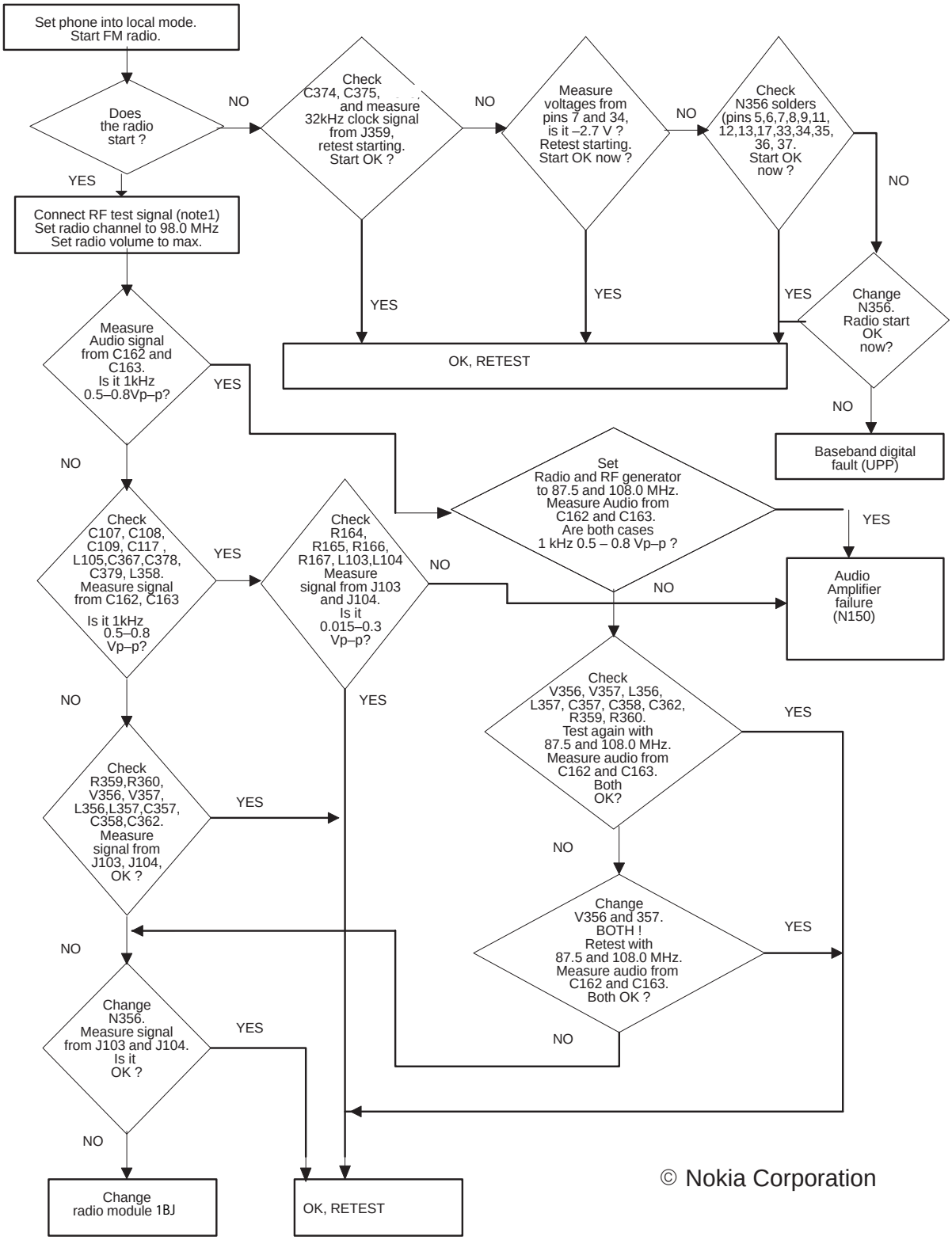
Figure 55: FM radio troubleshooting diagram


Set phone into local mode.
Start FM radio.
Does the radio start ?
NO
Check C374, C375, and measure 32kHz clock signal from J359, retest starting. Start OK ?
NO
Measure voltages from pins 7 and 34, is it –2.7 V ? Retest starting. Start OK now ?
NO
Check N356 solders (pins 5,6,7,8,9,11, 12,13,17,33,34,35, 36, 37. Start OK now ?
NO
YES
Connect RF test signal (note1)
Set radio channel to 98.0 MHz
Set radio volume to max.
YES
YES
YES
Change N356. Radio start OK now?
OK, RETEST
NO
Baseband digital fault (UPP)
Measure Audio signal from C162 and C163. Is it 1kHz 0.5–0.8Vp–p?
YES
NO
Set Radio and RF generator to 87.5 and 108.0 MHz. Measure Audio from C162 and C163. Are both cases 1 kHz 0.5 – 0.8 Vp–p ?
YES
NO
Audio Amplifier failure (N150)
Check C107, C108, C109, C117 , L105,C367,C378, C379, L358. Measure signal from C162, C163 Is it 1kHz 0.5–0.8 Vp–p?
YES
Check R164, R165, R166, R167, L103,L104 Measure signal from J103 and J104. Is it 0.015–0.3 Vp–p?
NO
YES
NO
Check V356, V357, L356, L357, C357, C358, C362, R359, R360. Test again with 87.5 and 108.0 MHz. Measure audio from C162 and C163. Both OK?
YES
NO
Check R359,R360, V356, V357, L356,L357,C357, C358,C362. Measure signal from J103, J104, OK ?
YES
Change V356 and 357. BOTH ! Retest with 87.5 and 108.0 MHz. Measure audio from C162 and C163. Both OK ?
YES
NO
NO
Change N356. Measure signal from J103 and J104. Is it OK ?
YES
NO
Change radio module 1BJ
OK, RETEST

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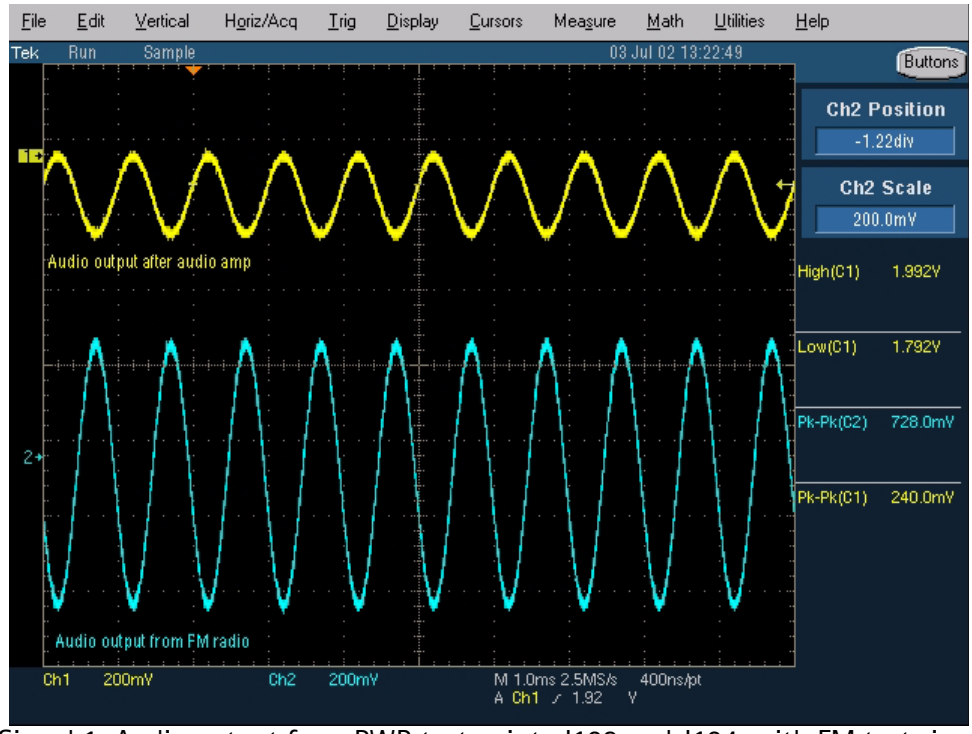
Diagrams of FM radio signals

Figure 56: Oscilloscope screen shot, Audio output



Signal 1: Audio output from PWB test points J103 and J104, with FM test signal, volume 100%.

Signal 2: Audio output from FM radio pins 22 and 23(same as in C162 and C163), with FM test signa

Figure 57: FM radio clock from test point J359, 32 kHz frequency clock signal, when radio is on.l

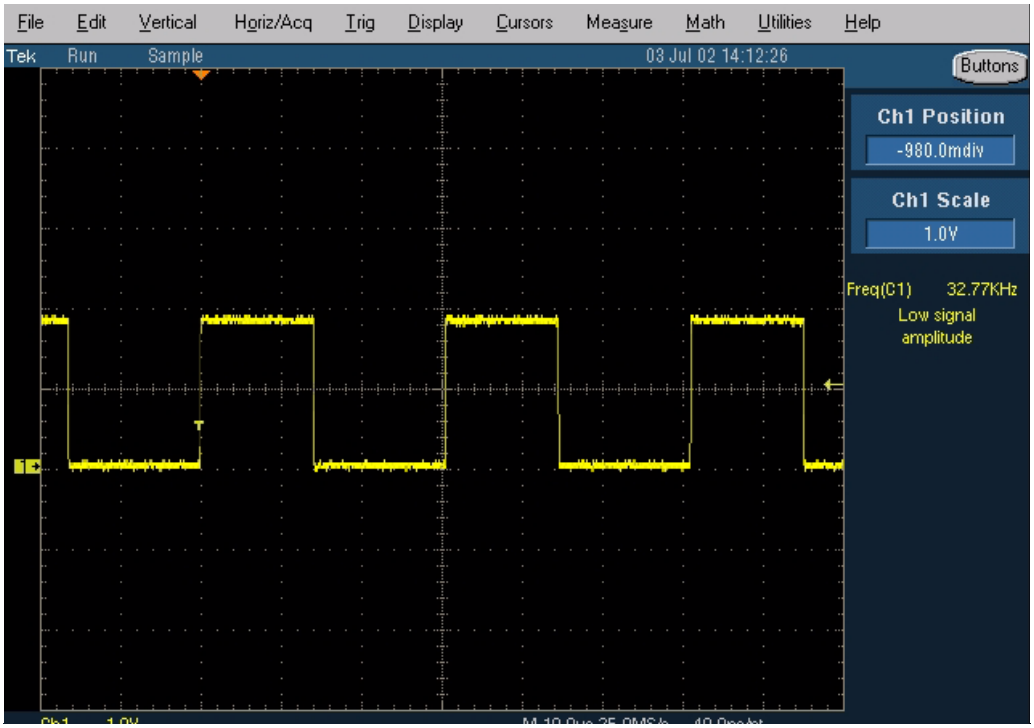


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Figure 58: FM frequency from FM radio pin 37, the other end of L358, with FM test signal

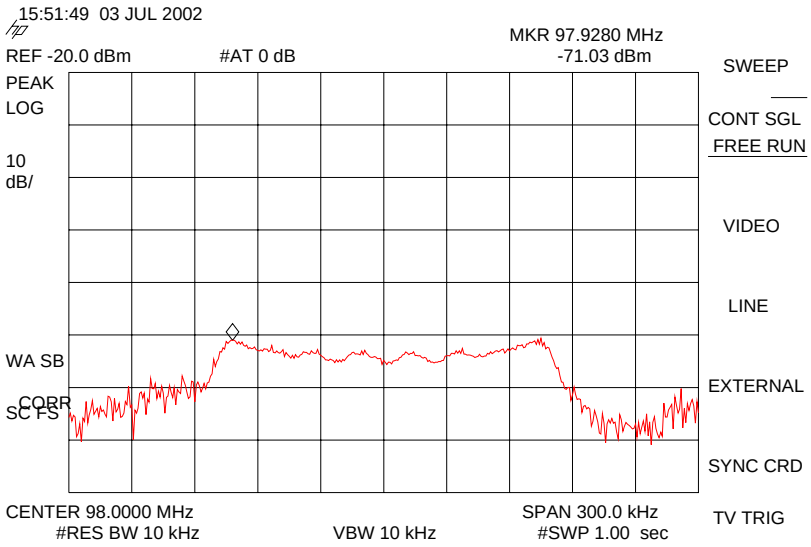
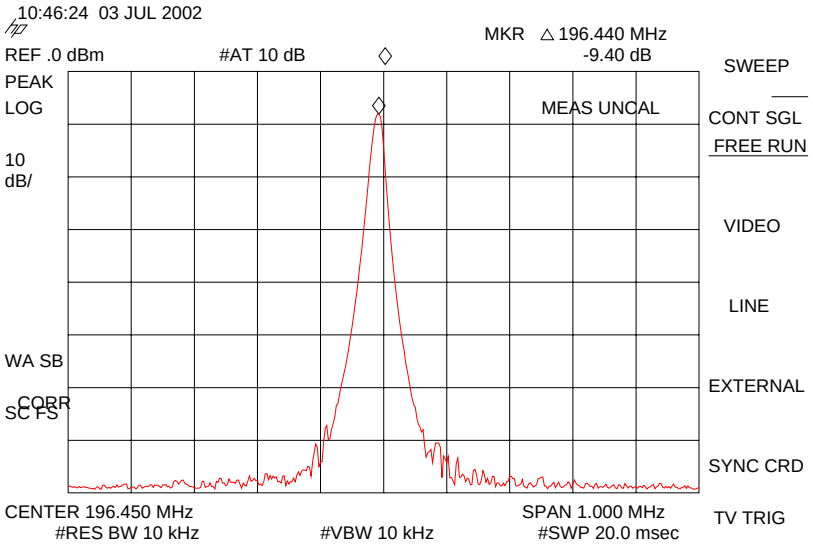


Figure 59: VCO frequency from FM radio pins 3 and 4, the other ends of V356 and V357, with FM test signal



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